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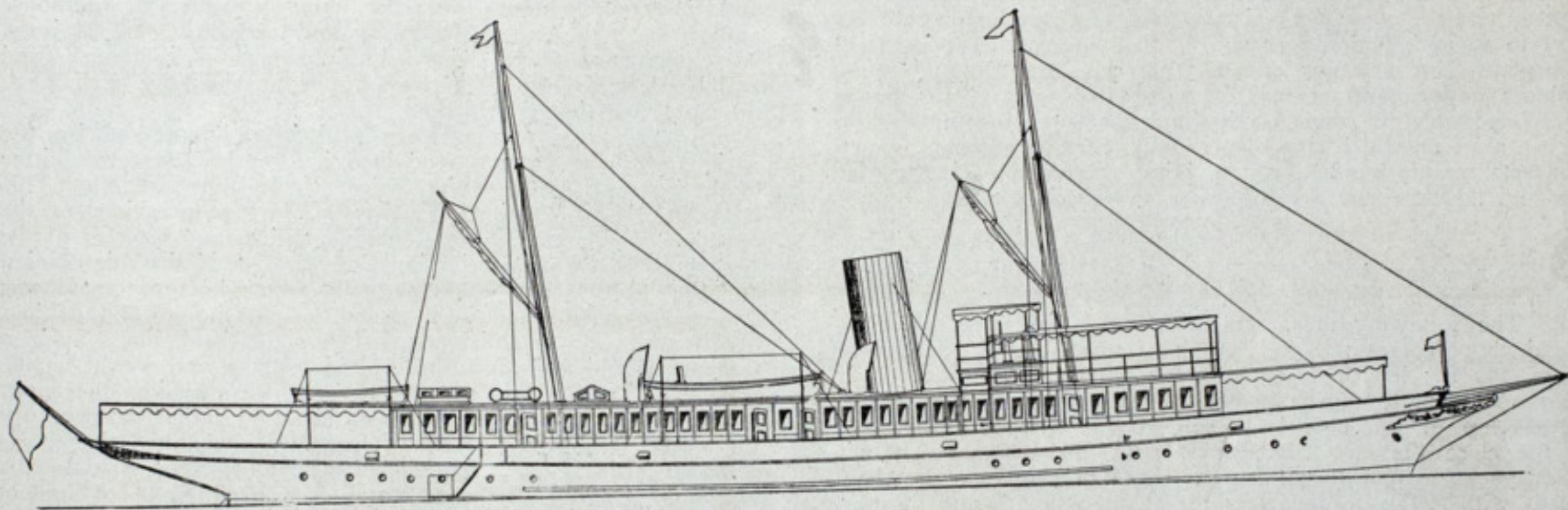
No. 15

PRESIDENT ROOSEVELT'S SENSIBLE SPEECHES

On his present tour President Roosevelt is making some very sensible speeches on the subject of trusts. He is not approaching the subject from the standpoint of those who are opposed to trusts nor yet for those who deny that trusts exist. He recognizes that great corporations are necessary and are efficient instruments of economy. His only desire is to see that they are regulated and controlled as far as may be necessary to subserve the public good. Some of the evils from which we suffer are the accompaniment of social changes which can be cured neither by law nor the administration of the law but by the slow change of character and economic environment. This view is undoubtedly deep and sensible. There are great evils which are part of the process of evolution but the tendency of the world is certainly upward and time will eliminate them. It is less than 200 years ago when women were put to death for being suspected of witchcraft; it is scarcely more than 100 years ago since men were hanged for minor thefts; and yet either of these things done today would appal the sense of justice, and, if persisted in by law, would bring instant revolution. It cannot be too much emphasized that the present age has no ancestry. It is meeting conditions which even its immediate progenitors did not have to meet and which no one, since the world began, has had to meet. It is really the pioneer in a field which covers, not merely the frontier, but the whole world; and it is natural that mistakes should be made. They

The Czarina is a particularly handsome, seaworthy and speedy craft, rigged as a pole mast schooner, with a clipper stem and overhanging stern. The builders guarantee a speed of 15 knots but the vessel has been so liberally powered that a speed considerably in excess of the contract requirement will be obtained. Her coal carrying capacity will give her a cruising radius of 3,000 miles at 9 knots speed. Her accommodations have been very carefully worked out, it being arranged to have the owner's quarters on the berth deck forward of the machinery space with quarters for the ship's officers and crew on this deck aft. In the forward end of the deck house is located the music saloon, an exceptionally large owner's room with private bath attached coming immediately aft of it. The dining room is located in the after end of the deck house with the pantry and galley immediately forward of it.

The hull is built entirely of steel, subdivided into six watertight compartments, and is fitted with a double bottom throughout the entire length. The single screw will be driven by a triple-expansion engine, having cylinders of 14, 22 and 36 in. diameter and common stroke of 24 in. They will develop 1,200 H. P. Steam will be supplied by two Mosher water-tube boilers, arranged to operate under induced draft. The Czarina is fitted with a Williamson steam steering engine and a steam windlass for working the anchors. She will be completely lighted with electricity, the dynamos for lighting being driven directly by a steam turbine. Large electric power is provided



Charles S. Bryan's Single-Screw Steam Yacht Czarina.

[Building at the Crescent Ship Yard, Elizabethport, N. J.]

are not the mistakes of individuals or of corporations but are the mistakes of a whole people grappling with new conditions. The remedy is to be found in the slow but ceaseless process of evolution. There were voices crying in the wilderness a hundred years ago because men were hanged for stealing sheep; but they were hanged because it was the consensus of opinion that that was the proper punishment for them. One might steal a whole continent of sheep today and rest assured that his neck, at least, would be safe. So there are voices in this wilderness of trusts, crying steadily against oppression and injustice, but these combinations of capital exist because it is the consensus of opinion that they are economically sound. Fifty years hence it may not be so; an hundred years hence the world may be as much appalled by the intelligence that one man had accumulated, by virtue of favoring tariffs, a fortune of several hundreds of millions of dollars, as the present generation would be if a human life were to be taken away for pilfering a loaf of bread. In the symphony which the nations of the earth are playing many discordant notes are struck but the high notes, which invariably carry sound the furthest, are always struck for justice.

LAUNCH OF THE CZARINA.

The single-screw steam yacht Czarina, building for Charles S. Bryan of New York at the Crescent Ship Yard, Elizabethport, N. J., was launched on Saturday last. The launching was a private affair, the vessel being christened by Mrs. Charles S. Bryan. The invited guests numbered about 200, including Mr. Lewis Nixon, president of the United States Ship Building Co., Mr. Mason S. Chase, president of the Crescent Ship Yard Co., and many prominent citizens from New York, Richmond, Petersburg and Palm Beach. The principal dimensions of the Czarina are: Length over all, 166 ft. 3 in.; length on waterline, 140 ft.; breadth, molded, 22 ft.; depth, molded, 11 ft. 6 in.; mean draught, 8 ft. 6 in.; displacement, 280 tons.

for use in connection with an elaborate lighting system. A large cold storage room is located on the berth deck aft, its temperature being regulated by a one-half ton Allen dense air machine. The vessel will carry four small boats, a 24-ft. power launch and a patent life raft.

SHIP BUILDING REPORTS.

Bureau of navigation reports show that in the month of March seventy-nine vessels of 31,448 gross tons were built in the United States. During the quarter ended with March 31, the number of new vessels was 187 and the gross tonnage 58,588, and for nine months ended March 31, the number was 814 and the tonnage 230,187. Shipbuilding. For nine months ended with March 31 a year ago the number of new vessels was 949 and the gross tonnage 245,065. Following is the complete summary for nine months ended March 31, 1903:

	Stages during March.	Higher Lower		Higher Lower	
		than during same month last year.		than during March, 1895.	
Lake Superior. . .	601.42 Ft	0.01 Ft.			0.13 Ft.
Lake Michigan	579.62 "	0.20 "		0.24 Ft.	
Lake Huron.	579.42 "	0.20 "		0.01 "	
*Lake Erie	572.37 "	1.34 "		1.27 "	

*Reported by Cleveland Office.

The largest new steel steam vessels of the past month are the Mississippi of 8,100 gross tons, built by the New York Ship Building Co. of Camden, N. J., for the Atlantic Transport Co.; the Tionesta of 4,329 tons, built by the Detroit Ship Building Co. for the Western Transit Co. of Buffalo; the Geo. L. Craig of 3,762 tons, built by the Craig Ship Building Co. of Toledo for Thomas Adams and others of Detroit, and the car ferry Manistique, Marquette & Northern No. 1 for Lake Michigan service, built at the Cleveland works of the American Ship Building Co.

HIGH-PRICED MATERIAL.

Discouraging Features of British Ship Building Situation—Leading Features of New Challenger—Naval Program—General Shipping Items from Glasgow.

Glasgow, April 1.—The discouraging feature in the ship building situation here is the high price of pig iron. This high price is due to the extensive speculation in warrants, whether that speculation be a legitimate outcome of the industrial situation in America and Germany or merely a gamble excited in sympathy with the great advance in copper and other metals. There is not, in so far as we can gather here, any increase in the actual demand for crude iron to warrant the advance that has taken place during the last few weeks, and although foreign ore is dearer coal is cheaper. Indeed, coal is distinctly on the downgrade notwithstanding the fact that the export figures so far have compared favorably with these for the corresponding portion of last year. An occasional cargo of coal is still being shipped from the north of England and from Wales to the United States, but these American orders now are insignificant and do not affect the market as did the run before Christmas. American orders for pig iron seem to have been choked off by the high prices now current here and at Middlesboro. One hears of large buying of German iron from America, but few orders are coming this way. It is true that steamers are being chartered and cargoes are being loaded of pig iron on the Tees, etc., but these are against contracts made before the rise. One or two cargoes of hematite iron have been sold lately for the United States, but no great quantity. A theory exists that the bulk of the Cleveland warrants (representing about 130,000 tons), which have been taken up by London dealers, are being held for American buyers, who will ship the iron by-and-by if it is required in the United States. But there is no evidence in support of this theory and there is a good deal of reason to doubt it. Cleveland warrants have reached 53s. (though now back to 52s.) and that figure is regarded as so very risky a one that the market is feverish and nervous. With warrants so high makers' prices are kept up and the consequence is that iron and steel manufacturers have to advance their prices and by so doing lose orders. Steel ship plates here are now £6 less 5 per cent. and although some builders under contract may be compelled to pay this figure it is impossible to frame on it (and current rates for copper, etc.) a price on which ship owners will order cargo boats. Such contracts as ship builders are receiving, therefore, (and they are few and far between) are for liners and special craft.

THE NEW CHALLENGER.

The new cup challenger, Shamrock III., is about to undergo trials, having finished fitting out in the James Watt dock, Greenock. The following measurements of her spars, etc., will be found about correct: Total length of mast, 170 ft.; length of boom, 102 ft.; length of gaff, 65 ft.; length of the yacht over all, 130 ft.; length from point of bowsprit to end of boom, 188 ft. Tuning up of the new boat will go on without delay, and at the close the two Shamrocks, with Sir Thomas Lipton's steam yacht Erin, will sail for the south of England. Portland Roads will be the headquarters for about a month and most of the trial matches will take place on the fine expanse of water outside of Weymouth and in the Solent. On the way back later on to the Clyde the yachts will call at Belfast Lough and there sail a match; and they may also have a race in Dublin bay. On arrival in the Clyde the final trial races will be sailed, and then the challenger will have her ocean rig and leave in company with Erin for the United States about the middle of June. Capt. Robert Wringe is in full charge of Shamrock III. He was colleague to Capt. Archibald Hogarth on Shamrock I. and sailed that boat against Shamrock II. in 1901, afterwards going out to America but taking no part in the management of Shamrock II. Shamrock I. is now in command of Capt. Charles Bevis.

NEW NAVAL PROGRAM.

With regard to the new naval program, although there has been no official indication of the design of any of the new ships it is probable that the battleships will be further improved in respect of gun-power on the King Edward VII. class, which cost from £1,350,000 to £1,426,266 each. None of the orders for the new battleships will be given out until late in the autumn, as the sum specified in the estimates for each before March of 1904 is only £44,660. In the case of the armored cruisers £107,950 is to be expended on each of the contract ships, which will resemble the new Duke of Edinburgh and Black Prince. For the protected cruisers only £5,700 is specified, which means that it is proposed to defer the ordering of these until the trials of the first of the third-class cruisers ordered a year ago. The scouts will be built earlier and also the destroyers, as the first of the new type of heavy ships of 25½ knots speed will be ready for trial in a few weeks time. The ten submarines will also be hurried forward. They will embody improvements in the system of propulsion, and the gasoline engine will be superseded in all the later boats now completing. The two coast guard cruisers are to be of a new type. In preparing the new work over £1,000,000 will be spent as compared with £700,000 a year ago.

Changes in administration at the admiralty include a new naval assistant to the controller, a separate department for contract work under a superintendent of construction work, and

the strengthening of the engineer-in-chief's staff. The board has decided to invite a few of the highest recognized experts in marine engineering to form a small committee to meet on occasion when summoned by the controller and give the board the benefit of their advice on any questions submitted to them.

BELLEVILLE AND BABCOCK & WILCOX BOILERS.

As a further item of interest in the boiler controversy it may be stated that the second-class cruiser *Hermes* has completed her contract trials after being re-fitted with Babcock & Wilcox boilers in place of the original installation of Belleville boilers. She is now being handed over to the navy boiler committee, who will conduct a long series of trials with the new boilers. The original installation of boilers was practically of the same weight as the new, 315 as compared with 316 tons, of which only 38 tons is for water in the boilers. On the full-power trial the Babcock boilers, working with an air pressure of ½ in., gave steam for a mean of 10,451 I. H. P., the coal consumption being 1.53 lbs., while on the eight hours' full-power trial with the original boilers the power was 10,264 I. H. P., and the fuel consumption 1.58 lbs. On the continuous steaming trial the Babcock boilers gave 7,824 I. H. P. with a coal consumption of 1.54 lbs., as compared with 7,713 I. H. P. and 1.59 lbs. per unit of power per hour with the Belleville boilers. The boilers thus seem about equal. The Belleville boilers had larger grate area—797 sq. ft. as compared with 760 sq. ft. in the new boilers, but much less heating surface—24,080 sq. ft. as against 26,520 sq. ft.

LIGHT DUES, LIGHT LOAD LINE INQUIRY, ETC.

The merchant shipping (lighthouses) bill has been introduced by Mr. M'Arthur into the house of commons. Its object is to transfer the whole administration of lighthouses, buoys and beacons to the board of trade and to create a committee, representative of shipping and trade interests, to assist the board of trade in such administration. All property now vested in the Trinity House, the commissioners of northern lighthouses, and the commissioners of Irish lights, as general lighthouse authorities, will be transferred to and vested in His Majesty. All expenses at present charged to the general lighthouse fund will be defrayed out of moneys to be provided by parliament, the light dues being abolished.

Contradictory opinions are still being expressed by the various shipping experts examined before the select committee of the house of lords on the subject of the light load line. This week has been examined Sir James Mackay, president of the chamber of shipping of the United Kingdom and director of the British India Steam Navigation Co., who stated that his opinion and that of the chamber of shipping which he represented was that no argument had been made out on the ground of loss of life for the establishment of a light load line. Such a measure would not effect the desired purpose and would not be workable. British ship owners, he said, were against the application of a light load and, as far as he could gather, no necessity for an act had been proved. When they considered that there were upwards of 9,000 British steamers and 10,000 British sailing ships trading, the percentage of proved cases of under-ballasting was absolutely infinitesimal and did not afford any justification for legislation. If it were true that an enormous percentage of steamers went to sea under-ballasted and in an unsafe and dangerous condition, how was it, he asked, that there was not a more serious record of loss of life? In the absence of record it must be held that the case presented to the committee could not be correct. On inquiry he had found that during the last four years the number of injured shafts had been steadily decreasing. Up to ten years ago the British India Steam Navigation Co. was in the habit of adopting Lloyd's dimensions for shafts, but in order to be on the safe side this company increased the dimensions in new ships to about 15 per cent. above that. Two or three years ago Lloyd's increased the size by 10 per cent. and the British India company then increased its shafting by 10 per cent. over the new rule. The problem of the deep load line was a comparatively simple matter, but a light load line was a difficult problem.

Ship builders on the Delaware have contracts under way aggregating over \$30,000,000. Altogether there are fifty-nine vessels in various processes of construction on the river. Seven warships, however, aggregate more than half the cost of the entire work. These are the cruisers *Pennsylvania*, *Colorado* and *Tennessee* for the United States navy, the *Medjidia* for the Turkish government, the *Denver*, *St. Louis* and *Washington*, the torpedo boat destroyers *Hopkins* and *Hull*, and the torpedo boat *Stringham* for the United States navy. The New York Ship Building Co. has under way two liners for the Pacific Mail Steamship Co., the *Minnekadha* and *Minnelora*; also the *Mississippi* for the Atlantic Transport Co. and the *Larimer* and *Ligomer* for the J. M. Guffey Petroleum Co. John H. Dialogue & Son are building a steamship for Lewis Luchenbach of New York and the Harlan & Hollingsworth Co. is building the *Calvin Austin* for the Eastern Steamship Co.

The first turbine steamer intended for cross-channel service has been launched at Dumbarton. She is christened the *Queen* and will be operated by the joint railways.

Modern Electric Steering Apparatus.

Frank C. Perkins in the Electrical Review.

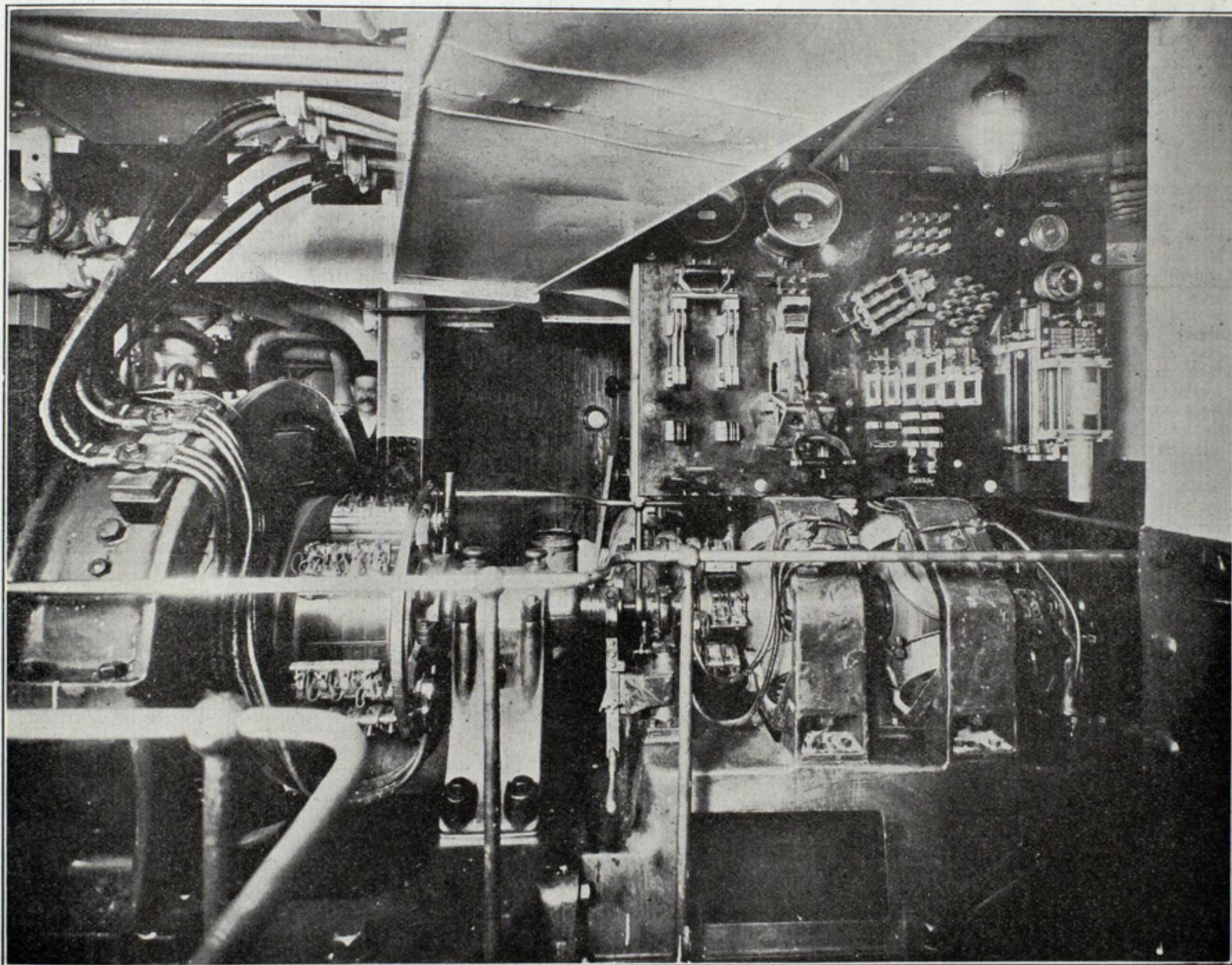
Electrical steering devices were designed in America, as well as in England, as far back as 1885. The early inventions of electromagnetic steering and reversing mechanism were at first proposed in connection with torpedo boats. Mr. Horace P. Griswold of Providence, R. I., made several inventions of this character about fifteen years ago for use with surface and submarine torpedo boats. His first invention included a device for automatically steering this small craft in any desired direction by means of electromagnets connected with the steering mechanism. The whole apparatus was self-contained within the boat and independent of control from the shore when in use.

Three years after Mr. Griswold's first invention he designed an electrically connected compass adapted to be automatically turned in either direction, and rudders actuated by mechanism controlled by means of this compass. The object of this in-

sary, connecting the torpedo with a discharging ship or station, and serving the double purpose of a mechanically propelling wire, and an electric conducting wire to connect the steering apparatus on the discharging ship with that in the torpedo.

Five years later, Mr. Charles W. Ayton of New York designed electric steering apparatus for torpedo boats, which would allow the craft, it was claimed, to start from a given point in the water and travel to a distant ship without any one on board, and without any connection with the point of steering. The Ayton steering device includes a mariner's compass which controls an electric current, which in turn operates a rudder whenever the boat steers either to the right or left from the course in which it has been adjusted.

During the past two or three years particular attention has been paid to the development of electric steering gear for large vessels, and the early devices for torpedo boats have been



Electric Steering Apparatus on the Steamship Finland.

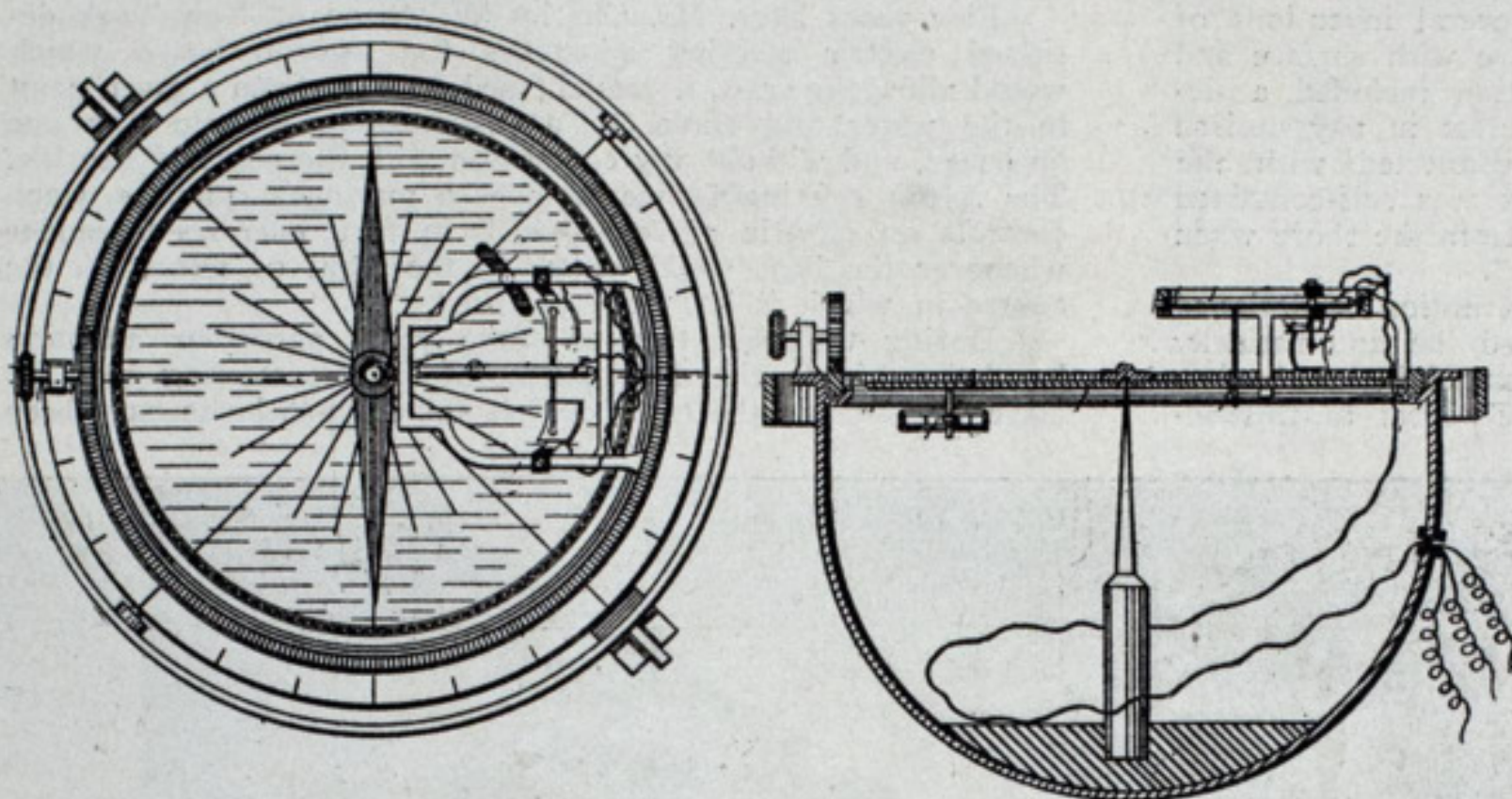
vention was to provide a submarine torpedo boat with means whereby it could be sent in any desired predetermined course and to any desired distance within its limits, the boat being wholly independent of control from the starting station, after being sent out on its course, and until its return, unless it should meet an obstruction. In this mechanism the boat is provided with a conceal-float, which is automatically released just after the boat has passed over the greater portion of its prescribed course, and prior to its arrival at the starting station. The propelling mechanism is stopped at the same time by automatically switching off the electric current.

In the same year that the latter device was designed, 1888, Mr. James O'Kelly of London and Bernard A. Collins of Nunhead, England, also patented in this country an electric steering apparatus for torpedo boats, whereby they could be rendered self steering in any previously determined direction, and when once started on their course could be controlled from a station, and their course altered so as to cause them to follow a moving object until they strike it. In order to do this a wire was neces-

practically forgotten. Recently Lieut. Bradley A. Fiske has developed a method for operating steam steering engines which are now extensively used on large ships, by electrical means. His method consists of using a small induction motor geared with the steering wheel, and wires connecting this motor with the steam steering engine. This engine is controlled by a reversing valve, and runs in one direction or the other according as the valve is moved, and the latter is normally in a central position when the engine is at rest. There is a pin on the shaft of the motor which engages with a lever connected with a reversing valve of the steering engine. The valve is operated in one direction or the other by means of the small induction motor, when the steering wheel is turned, the current generated in the wheel motor produces a torque in the engine motor. By this device the engine moves the rudder on one side or the other when the polyphase generator is manually operated by the hand steering wheel. When the steering wheel is stopped, there is no longer any current generated in the rotor or armature of the polyphase machine, and the springs bring the reversing valve

to a central position, in this way cutting the steam from the steering engine.

Other automatic steering devices have been invented which are merely controlled by electrical means, the power instead of being supplied by a steam engine consisting of a compressed air supply. In 1885, Mr. Charles H. Washburn, of New York, invented an automatic steering apparatus, with a compressed air cylinder, and piston, operating the tiller wheel chain. The main rotary valve was of peculiar construction, and was arranged

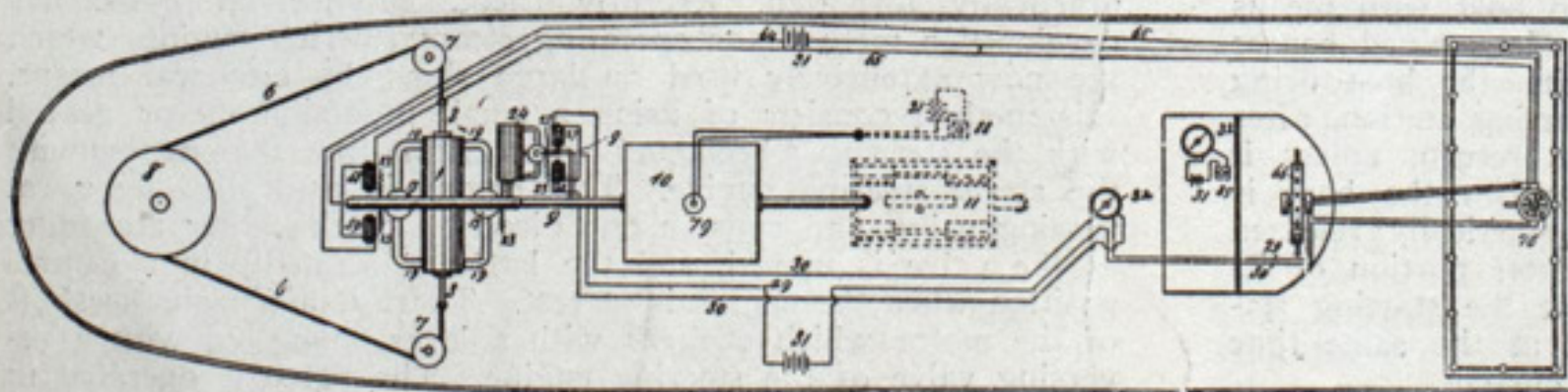


Washburn Automatic Steering Apparatus, 1885.

to be operated by an auxiliary cylinder and valve regulated by electric magnets. These magnets were actuated by a current controlled by the movement of the needle of a mariner's compass. This compass consisted of an ordinary bowl supported in the usual manner and containing a balanced card, supported above the card was a rocking bar properly insulated with an arm extending horizontally from each side. Depending from each arm was a swinging rod having a flexible termination formed of links, and secured to the supported frame at each side were curved plates. The plates and rocking bars were designed to be electrically connected with the magnet operating the auxiliary valve, a suitable battery supplying the current.

While electric motors have recently come into prominent use for the movement of the steering apparatus of large ships, up to within a few years steam engines have been almost exclusively used for this work when large power was required. In 1886, Mr. James A. Tilden of Hyde Park, Mass., invented an apparatus for steering ships which was designed to automatically control and operate the rudder, promptly bringing the ship upon a desired course whenever from any cause she has been altered therefrom. The device was designed to be applied to steam steering gear, or electric motor driven steering apparatus. The first part of the Tilden apparatus relates to the opening and closing of an electric circuit by the ship's compass-wheel in such a manner that an electric motor or system of magnets will act upon the valve, regulating the steam steering gear whenever the circuit is closed, and will cease to act the minute the circuit is open. The second part of this invention relates to the arrangements of electrodes in such a manner that the current of electricity shall be regulated through them by the action of the ship's compass needle. The conductors are connected in such a manner that the ship's compass-bowl may be freely revolved upon the center of its base, and always maintain good electrical connection.

In 1895, a Frenchman, Rodolphe Noury of Nouveau Calere, Greece, invented an electrical steering gear in which



Washburn Automatic Steering Apparatus, 1885.

the essential object was to enable all manual operations for steering a prescribed course by the mariner's compass to be dispensed with. It was his intention to replace the same by an automatic steering device in which the mariner's compass, as a whole, was called the "governo-motor" compass. This con-

sisted essentially of two parts, the first being the mariner's compass fitted with its adjusting arrangement, and second, the transmitting device for operating the helm in consonance with the movements of the compass, the transmission being effected by an electric current.

Among the recent designs of electric steering gear in which electric motors are employed, should be mentioned that of Maxwell W. Day, of Schenectady. This arrangement is used for steering vessels and moving turrets, and includes an electric motor geared to the rudder, as well as an electric generator with two field windings wound in opposite directions. There are two rheostats provided in connection with this method for controlling the current to the field winding. The current flowing in one part of the differential field winding is controlled entirely from the steering-wheel. The flow of current in the other part of the field winding is controlled from the rudder. When the two rheostat arms are in the same position, both field windings will have the same current in each, opposing each other, and the motor will be at rest, as no current is generated by the dynamo.

If the steering wheel is now moved in either direction, one of the rheostat arms is shifted, and more current is caused to flow in one field coil than in the other, resulting in a current being generated by the dynamo, and the motor moves the rudder to the desired position. As the motor moves the rudder, its rheostat arm also turns until the field windings again are equally supplied with current, and the generator no longer operates the motor.

The Russian cruiser Variag is equipped with an electrical steering apparatus, in which electric motors are used for supplying the necessary power. The steamship Finland was recently equipped with electrical steering gear by the Electro-Dynamic Co., in which a 60-H. P. motor of 110 volts was mounted on a Brown tiller.

The Earl of Crawford's yacht Valhalla was originally equipped with a hand steering gear, but this was altered to adapt it for electric driving. Some ship owners have not had the opportunity to convince themselves of the success of electric steering gear, and are unwilling to adopt electricity exclusively for this purpose. Many of them, however, have had installed a spare electric steering gear to take the place of the hand

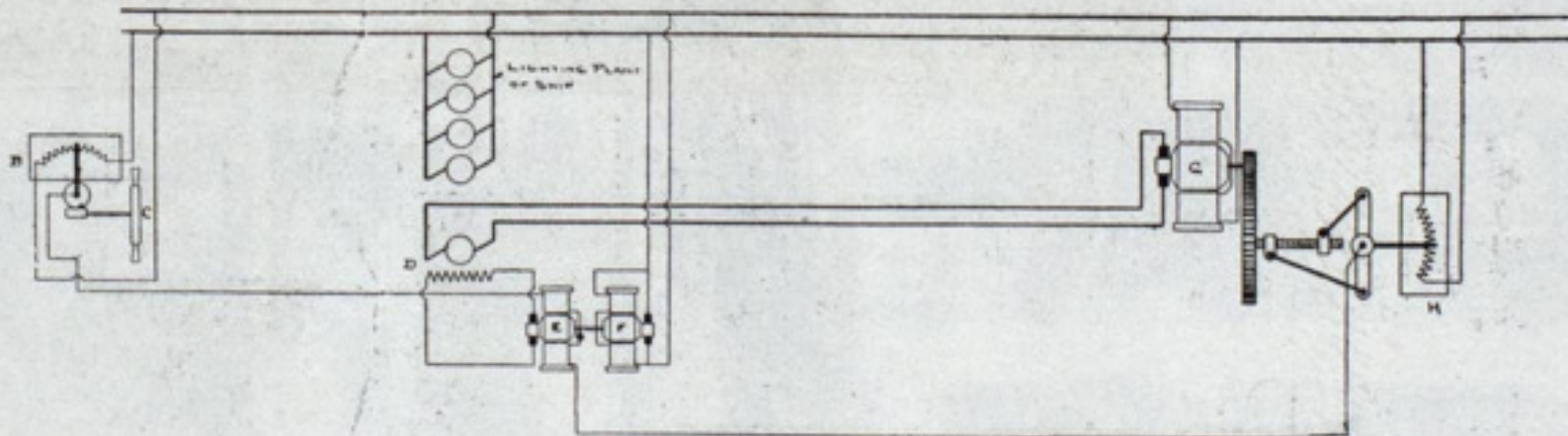


Diagram of Connections, Auxiliary Electric Steering Gear—Pfatischer's Patent.

gear. It is a well-known fact that in case of a breakdown to the steam gear, and the necessary substitution of the hand gear, the speed of the vessel has to be much reduced. With the electric gear any one of the ship's dynamos can be used in such an emergency to supply current to the electric motor moving the rudder. When this method is used no reduction in speed is necessary.

In the Pfatischer arrangement for auxiliary steering gear, a motor-generator of two kilowatts capacity is employed in connection with the existing dynamo of the ship's lighting plant. In addition to the steering column located on the bridge, or in the steering gear room aft, there is an automatic following up gear, and an electric motor for operating the rudder. The accompanying illustrations show the apparatus for electric steering employed on the steamship Finland, which was constructed by William Cramp & Sons of Philadelphia.

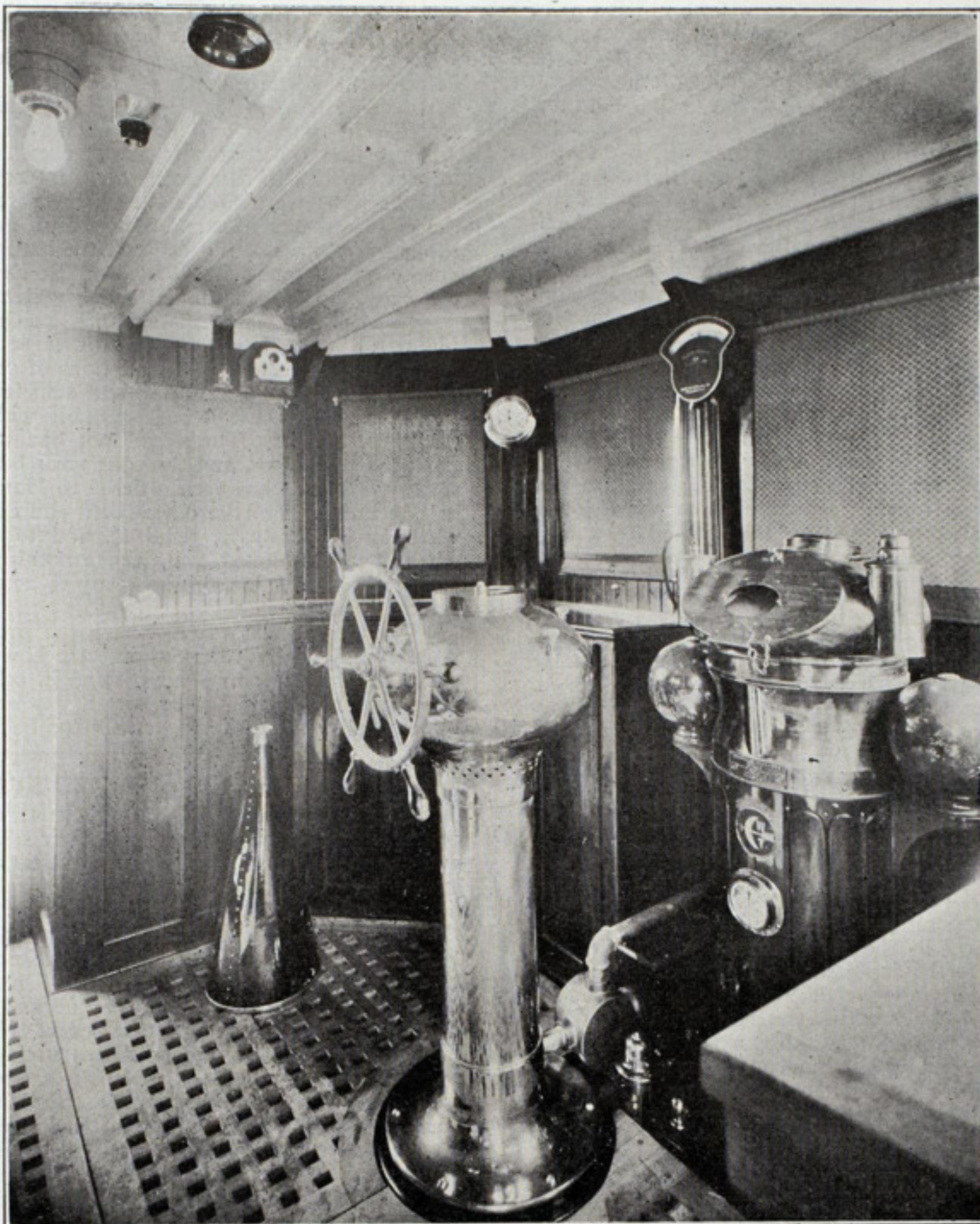
The electrical equipment for this vessel includes a 60-kilowatt dynamo having a pressure of 110 volts, a small shunt-wound dynamo of the same voltage for use as an exciter, and a steering gear switchboard. The main generator is operated at a speed of 375 revolutions per minute by a Sturtevant engine, and the exciter has its armature also directly connected to the same engine shaft, a clutch being employed which will disconnect the exciter from the main dynamo.

The North Atlantic liner Finland, of the Red Star Line, has a capacity of 13,000 tons and operates at a speed of 17 knots per hour. This is one of the largest steamers which has ever been equipped with electric steering apparatus, although several ships of the Russian navy have been electrically steered, and several much larger vessels will be equipped in the near future.

The Valhalla is 239 ft. long and has a beam of 37½ ft. It has a tonnage of 1,490 and a draught when in trim of 18½ ft.

The accompanying illustration shows the arrangement of the electric steering gear of the English yacht owned by the Earl of Crawford. It consists of a cast iron frame bolted to the deck, as shown, the upper end of the rudder post passing through the base of the frame. There is a right and left-hand screw running fore and aft, and supported in the frame. This screw carries a right and left-hand nut. These nuts are prevented from turning by two guides running parallel with a screw, and they are connected one to each side of the cross-piece on the rudder post by links, and in this way the rudder is moved by the turning of the screw. The arrangement is such that in an emergency the steering wheel may be operated by hand as it is carried on a sleeve on an extension of the screw, and it can be connected by means of a clutch. By giving the steering wheel twelve turns the rudder can be moved a total distance of 80 degrees, or from hard-a-starboard to hard-a-port. A stop device is arranged which prevents the steering wheel from turning more than twelve revolutions, a switching device automatically cutting off the current when the extreme positions of the rudder are reached.

It is stated that the electric steering apparatus on this yacht has proven very satisfactory, as it will throw the rudder the total angular distance while steaming full speed astern, without the use of an excessive amount of current, and with perfect ease. A quadrupolar motor of the Siemens enclosed type is arranged to drive the

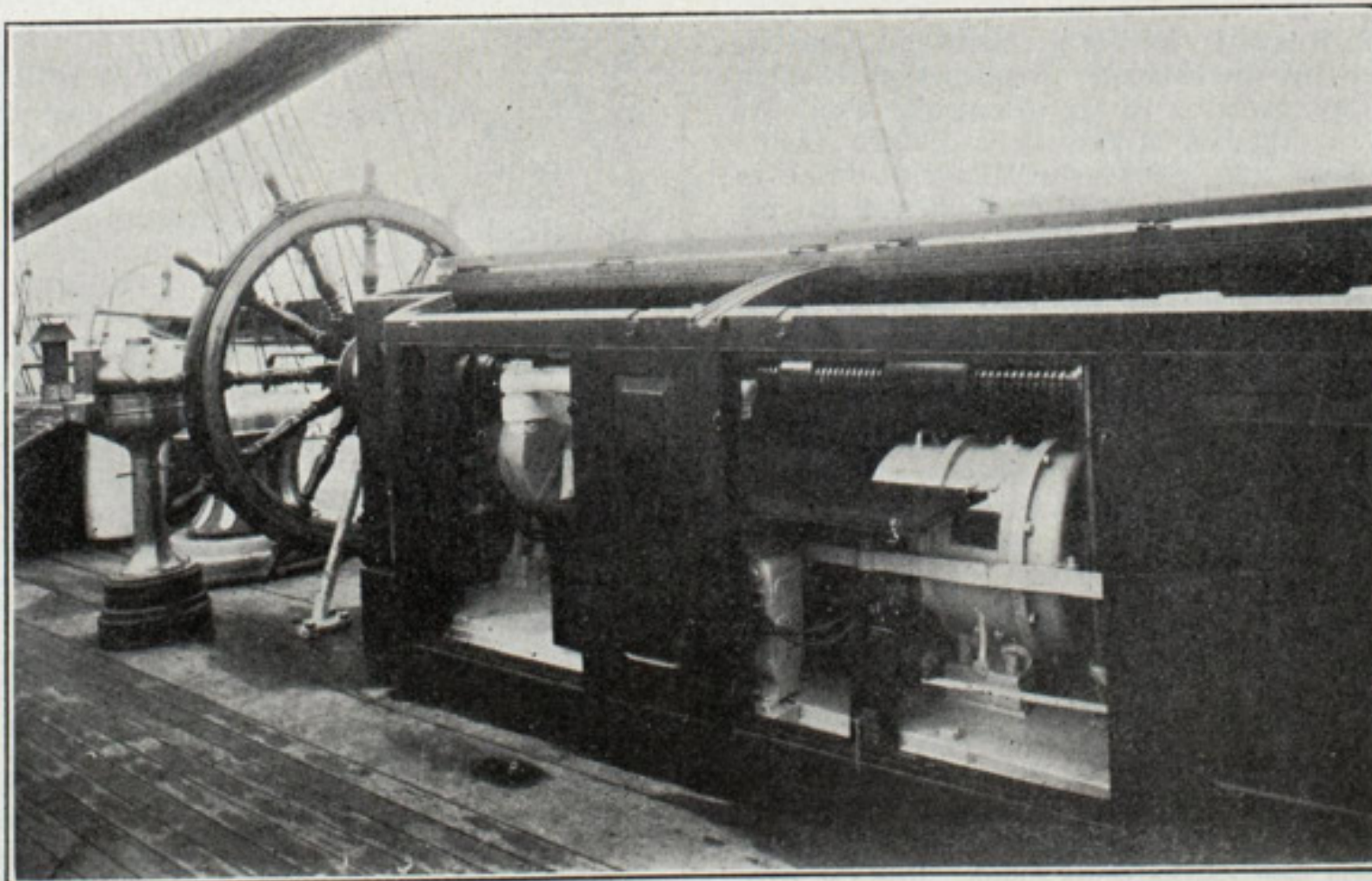


Electric Steering Apparatus on the Steamship Finland.

which operates on all the contacts of each switch. The starting switches are operated in the following manner. There are two switch arms mounted on two pins on a metal disc at equal distances from its centre. As the disc is geared to the screw, its motion is proportional to that of the rudder. The switches have crank arms which can be moved so as to put the switches off or on by means of stops on a second disc mounted concentrically with the first disc. The steering wheel is geared to

the second disc and therefore its motion is proportional to that of the steering wheel. The switching off or on of the current is the result of the difference in the motions of the two discs. It is therefore proportional to that of the steering wheel and rudder. Each switch has its arm so arranged that it clears the stops on the second disc when its motion is in one direction, but engages them when the motion is in the opposite direction. This arrangement makes it certain that only one switch is operative in either direction.

There is every



Electric Steering Gear on the Valhalla.

reason to believe that electric steering gear will be utilized more and more in the future. There is no question but that it is equally as reliable as any other method, and all of the large steamers and battleships are now supplied with complete electric power plants, from which the current can be obtained. Electricity is being utilized in every part of these large boats at the present time, and there should be a considerable saving in space by the use of the electric motor for operating the tillers.

There is also the advantage that there is no waste of energy when the motors are not in operation. The condensation of steam means considerable loss in long pipe lines connecting the boilers with the steam steering engine. Electric conductors can be more easily run to the rear of the ship for supplying the necessary energy for operating the rudders than can the steam pipes, which are otherwise required. On all the modern warships, both in this country and in Europe, electric motors are employed in almost every place where power is required. The training of the guns and moving of the turrets, as well as the raising of the shells, are all accomplished by electric power. Electric ventilators, searchlights, and arc and incandescent lights, all are supplied from the same power plant. Electric steering apparatus is bound to take its place among these modern appliances.

NEW YORK NOTES.

New York City, April 8.—Mr. W. L. Moody of Galveston, Tex., has just placed an order with the Marine Construction & Dry Dock Co. for a 60-ft. twin-screw, high-speed cabin launch. The beam is 11 ft., with 28 in. draft. The stern beneath waterline will be of the torpedo-boat type with a yacht overhang. This type of construction has become very popular among the best architects this season. It gives all the advantages of the torpedo boat beneath the water and at the same time the overhang stern gives a correct yacht appearance with increased deck room. Owing to the restrictions on the draught, the stern will be slightly tunneled. The motive power will be supplied by two 20-H. P. standard gasoline engines. The pilot house will be 8 ft. long and fitted with extension berths. Aft of the pilot house will be the engine room, which will also be fitted with two pipe berths for the crew. Aft of the engine room will be the toilet and galley. The aft saloon will be 7 ft. long, which will also be fitted with extension berths. There will be considerable deck room fore-and-aft, which will be fitted with awnings. It is the intention to make this boat one of the most handsome and serviceable crafts of her type. She will probably be taken to Galveston under her own power, as she will be well closed in and will be built with an object of making her exceedingly seaworthy.

Mr. Geo. W. C. Drexel of Philadelphia has ordered two more launches from the Marine Construction & Dry Dock Co., which are to be used in connection with his summer camp in Canada.

Mr. Arnold Schleit of New York has recently placed a contract with this company for a 36-ft. cruising launch. This boat will be fitted with a 15-H. P. standard gasoline engine.

Mr. George L. Morse of Brooklyn is having an auxiliary sloop built by this company which will be ready for delivery by June 15.

The 116-ft. steam yacht built for Mr. F. E. Underwood, president of the Erie road, was launched a short time ago and is now having her machinery placed.

There are eight other launches of from 50 to 80 ft. being built by this company, all of them will be ready for commission about June 1.

The schooner yacht Ramona, formerly owned by Gen. B. M. Whitlock, and later by the Marine Construction & Dry Dock Co., has been sold by the latter to Mr. Alexander Peabody. She will be thoroughly overhauled at the works of the aforementioned company and go into commission May 1. She is 135 ft. over all, 25 ft 7 in. beam, with 12 ft. draught, and carries a crew of fifteen men.

The New York Ship Building Co., Camden, N. J., has been awarded a contract for building a 75-ft. fire boat for New York city, being the second such boat lately awarded to this company by the city, and thereby hangs a tale, which it is unnecessary to chronicle herein, redounding to the credit of Mr. W. De W. Dimock, New York representative of the New York Ship Building Co. and the New York city authorities, whereby a contract was made which was of advantage to both parties, a case seldom met with, and which required the keenest business astuteness on the part of both parties to consummate.

Although it is 100 years ago this spring that on the Victory, which will haul down her white ensign for the last time about two months hence, Nelson hoisted his admiral's flag, she was actually launched in 1765 at Chatham. She cost, complete, \$500,000. It is interesting to recall that before she passed under the power of Howe and Hood, and finally became famous under Nelson, she carried admiral Keppel, the great uncle of the present veteran admiral of the fleet of the same name. For the past eighty years the Victory has been flagship at Portsmouth and she is now to be replaced by the Hercules.

DEFECTS IN MAINE'S GUN MOUNTS.

Several messages have been received at the navy department from Capt. Leutze, commanding the battleship Maine, regarding defects in the gun mounts of that vessel, but officials at the department feel sure that the necessary repairs can be completed at Norfolk in time to enable the Maine to accompany the North Atlantic fleet on its trip to the Azores. Capt. Leutze says that in gun practice in the Caribbean eight rounds from each of the Maine's guns were fired with fairly successful results, although the emplacements of some of the 6-in. guns on the upper deck showed weakness. In order that the nature of the defects should not be exaggerated, Rear Admiral Bowles, chief constructor of the navy, has issued the following statement:

"No detailed information has reached me regarding the Maine. But we have had two or three telegrams stating that the gun emplacements or foundations of several of the 6-in. guns, of which there are sixteen, are not sufficiently rigid, and we have discovered that there is some trouble with the turning gears of the 12-in. turrets. The vessel not having been finally accepted from the contractor, and the contractor being responsible for this work, the Maine has been ordered to Hampton Roads for examination in behalf of the department and contractor, to determine what work, if any, is required, and to settle then where and when it will be done. I anticipate nothing serious, and am confident that the Maine will be ready to accompany the fleet on its summer cruise."

The department is anxious for a prompt and thorough investigation of the Maine's defects, however trivial they may prove, so that they may be avoided in other ships of the Maine class now building. In the past it has been found that the emplacement on some of the vessels has been unnecessarily strong.

AMERICAN AND RED STAR LINES.

New York, April 8.—All of the transatlantic lines are, of course, now directing attention to their sailing lists for the spring and summer seasons and to improvements in service. The management of the American and Red Star lines are calling particular attention to the reappearance of the steamer New York on the New York-Southampton route and to the fine new vessels—Finland, Kroonland, Vaderland and Zeeland—of the Red Star Line service to and from Antwerp. The New York has a new stern with the shafting inside the hull and a complete new installation of the most modern machinery. Much of the interior of the steamer has been remodeled, a number of deck cabins and suites have been added, the dining saloon redecorated and refurnished, a new smoking room built on the promenade deck, and the upholsterings and fittings in general have been renewed throughout. The New York will take her place in the service April 15.

It is probably not generally known that the Finland and Kroonland, the last of the quartet of new steamers built for the Red Star Line, are the largest vessels carrying the American flag. All four of the new Red Star Line steamers are larger by about 1,000 tons than their consorts of the American Line. Except in the one point of speed these vessels are the equal of the finest steamships afloat. There are now twenty-four vessels of 181,200 tons in these two lines, as follows:

	Tonnage	L'gth feet	B'dth feet
Finland	12,760	580	60
Kroonland	12,760	580	60
Vaderland	12,736	580	60
Zeeland	11,905	580	60
Merion	11,635	530	59
Haverford	11,635	530	59
St. Louis	11,629	554	63
St. Paul	11,629	554	63
New York	10,674	560	63
Philadelphia	10,433	560	63
Kensington	8,669	495	57
Southwark	8,607	495	57
Friesland	6,409	455	51
Westernland	5,708	455	47
Noordland	5,150	419	47
Belgenland	3,873	413	40
Rhynland	3,868	413	40
Pennland	3,867	374	41
Ohio	3,392	355	43
Pennsylvania	3,166	355	43
Indiana	3,158	355	43
Nederland	2,610	338	39
Switzerland	2,602	338	39
Conemaugh	2,328	310	37

It is stated that the Canadian Pacific Railway Co. has succeeded in insuring the fourteen steamers which it recently purchased from Messrs. Elder, Dempster & Co. at the rate of 4 guineas per cent. per annum as against the rate of 8 guineas per cent per annum, or exactly double, paid by the late owners. The railway company saves between \$150,000 and \$200,000 by the new rate of premium, in consideration of which it undertakes to improve the navigation of the St. Lawrence.



LAKE SHIP YARD MATTERS.

"If we are to judge by the marine work thus far secured for our machinery department," says one of the officials of the Great Lakes Engineering Works, Detroit, "we will certainly have a fair share of orders in the new ship yard when we get it under way. Our present facilities have been so taxed that we have been running two turns right along and there is no indication of an end to the rush. Much of the work is of a marine repair kind, although our business is general in machinery lines." The list of vessels getting repairs at the Great Lakes works includes the steamers Seattle, Alert, Miami, Darius Cole, Metropole, Starke, Majestic, ferry boat Pleasure, fire boat Elliott, steam yacht Cynthia and tugs Oneida and Florence. In addition to a large number of previous installations on lake vessels of the "Hydro-Carbon" system for increasing steaming capacity and consuming dense black smoke, the Great Lakes company is now installing that system on the government steamer Visitor, the steamers Ionia and Pickard of Detroit, the Islander of Mackinaw, the Rideau Queen, owned by the Rideau Trans. Co., and the Petrel, owned by the Collins Bay Rafting & Forwarding Co.

A Chicago correspondent gives details of a large number of repair jobs on both steel and wooden vessels, including vessels of the Lehigh Valley Line, Anchor Line, Union Line, Hines Lumber Co. and others, carried out at the works of the Ship Owners Dry Dock Co., Chicago. Bottom repairs on the steel steamer Owego and Chemung required considerable time, especially as it was necessary to take out the Owego's stem. "If repair work continues as of late with this company," the correspondent says, "it will not be necessary to bother about contracts for new vessels." It is expected, however, that work on the Milwaukee fire boat at the Ship Owners' yard will be hurried, now that the repair jobs are quite well taken care of. The fire boat will be launched in two or three weeks and she can be completed within a couple of months following the launch, as engines, boilers, pumps, etc., are all ready to be installed. Mr. W. J. Wood, naval architect of Chicago, who is representing the Milwaukee fire department in the construction of this boat, is also looking after the interests of the Dunkley-Williams company of South Haven in the building of a fast freight and passenger steamer at the Craig ship yard, Toledo.

An order was placed some time ago with the Jenks Ship Building Co., Port Huron, Mich., for a freight steamer, to be a duplicate of the W. H. Mack, building at the Cleveland works of the American Ship Building Co. Cleveland owners for whom the vessel is building, ask that their names be withheld for the present.

After a general overhauling at the works of the Craig company, where she was built, the fast passenger steamer Chippewa will go down the St. Lawrence canals to New York. The Iroquois, another small but speedy steel steamer, also built by the Craigs of Toledo, will go with the Chippewa to the seaboard, to be engaged on runs out of New York city.

OPENING STILL DELAYED.

More than half the lake fleet would have been in service this week but for the strike of firemen. A few vessels have been started with non-union men in the stokeholds, and it is quite evident that notwithstanding the disinterested position of the vessel owners who have no freight contracts and would therefore like to see the opening of navigation delayed as long as possible, the managers of the ore companies' fleets are determined upon a wage struggle, the only question involved, with the one organization that failed to reach an agreement. This is shown by the opening up of the shipping offices of the association for the purpose of securing firemen and oilers. Fortunately for the vessels, the various unions of other employees with whom agreements have been made, including the engineers, refuse, in accordance with their agreements, to enter into a sympathy strike. The vessel owners base their refusal to pay the wages demanded by the firemen on the fact that the scale of the fireman is higher than that agreed upon with other branches of labor—wheelmen and watchmen—who have in the past been practically on a level from a wage standpoint with the firemen, and that more trouble would certainly follow if the demands of the firemen are granted.

In the meantime each day of the delay is helpful to a large part of the lake fleet as regards freights, and the owners of vessels who see no immediate chance of making freight contracts at profitable figures are quite satisfied to look upon this final labor difference with no great concern as to its settlement.

NEW CLEVELAND-DETROIT LINE.

That a new line of steamers is to be put on the route between Cleveland and Detroit is now assured and it is expected that the line will be in operation during the present month. Capt. Miles Barry, the Chicago vessels owner, is the prime mover in the new enterprise. Docks have been secured at both ends of the route and the steamers Badger State and Empire State are now being fitted out at Chicago for the service. As the Cleveland terminal, Capt. Barry has leased the dock and warehouse at the foot of Front street, formerly occupied by the Union Transit Co. The dock secured at Detroit is located in the lower part of that city. A number of Clevelanders are interested in the new company and when it is organized next week a Cleveland man will probably be elected president. The name of the new company has not been as yet determined upon but it will probably be the Cleveland & Detroit Steamship Co. It is not the intention of the new company to endeavor to obtain business by cutting rates. It believes that there is sufficient volume of business to justify the establishment of a new line and that it will have the immediate patronage of shippers who have reason, of course, to welcome competition. Inquiry undertaken among shippers tended to show that a certain volume of trade would be diverted at once.

Capt. Barry is, of course, not new to the business. He has operated tugs and steamboats on Lake Michigan for a number of years.

LAKE VESSELS LOST ON ATLANTIC SEABOARD.

Wooden vessels of the lakes that have been sent down the Canadian canals during the past three or four years for coasting trade on the Atlantic seaboard are fast disappearing. The dispatches this week tell of the loss of two more of them, the steamer J. J. Hill, formerly of Marine City, Mich., and the barge John C. Fitzpatrick, formerly of Cleveland. The Fitzpatrick foundered in a gale off Shinnecock. The tug Sweepstakes had started from Philadelphia to tow the barges Ash and Fitzpatrick, both loaded with coal, to New Bedford. The Fitzpatrick was astern of the Ash. About midnight a distress signal was sent up from the Fitzpatrick and the tug was put under one bell with just headway enough to steady the barges. About 3 o'clock a terrific explosion was heard on the Fitzpatrick but it was impossible in the sea that was running to turn about to ascertain the cause. The tug kept as close to Shinnecock as possible and waited until daylight but nothing could then be seen of the Fitzpatrick. It is believed that she sprung a leak and that her donkey boiler later exploded. Capt. Davis and her crew of four men were drowned. The Fitzpatrick was owned by the Boutelle Transportation Co., in which Benjamin Boutelle of Bay City and John Mitchell and Wm. Becker of Cleveland are the principal stockholders. The Sweepstakes and Ash are owned by the same company. The Fitzpatrick is the second vessel which the company has lost on the coast. About a year ago the schooner Wadena went ashore off Nantasket beach and it was while working upon that vessel that W. H. Mack of Cleveland lost his life.

The John J. Hill burned at sea. The smoking derelict was discovered 90 miles southeast of Frying Pan shoals lightship by the Morgan Line steamship Jupiter. Capt. C. H. Johns of the burned steamer, which was lumber laden and bound from Jacksonville, Fla., for New York, with six of the crew, were landed at New Orleans by the steamer Excelsior. Two of the crew were killed in the effort to launch the lifeboats and two were washed overboard. Chief Engineer Thomas Atwell, Hugh McMicken and two Spanish sailors were rescued by the American bark Lillian.

Capt. James Davidson of West Bay City, Mich., denies that he has closed his ship yard or that he even intends to do so. What he has done, he says, is to close it until such time as labor is willing to return to work at the old scale of wages. It appears that the ship carpenters and other workmen were demanding more than he will pay. He will reopen his yard, he says, when they see fit to return to work at the old scale. Capt. Davidson now takes a very gloomy view of the future of lake trade, claiming that there is more vessel capacity than is necessary. He is very outspoken concerning the doings of the executive committee of the Lake Carriers' Association, and the one special thing which is to him past fathoming is the provision granting 25 cents extra pay to seamen for labor performed beyond their watch. When he read that he sparred for wind.

CONSOLIDATED LAKE SUPERIOR CO.

Mr. Cornelius Shields is Elected President and General Manager—The Group of Industries Founded upon a Well-matured Plan—The Company's Future.

When President Lewis of the Consolidated Lake Superior Co. resigned last fall Mr. Francis H. Clergue, the general manager of the companies, insisted that the next president should be a practical man and should be able to render valuable assistance to the associated industries at the Sault by establishing his headquarters there. Mr. Cornelius Shields, vice-president of the Dominion Iron & Steel Co., has been elected president of the Consolidated Lake Superior Co. and is to locate at Sault Ste. Marie as the general manager of the enterprises, thus relieving Mr. Clergue of many details. Mr. Clergue will remain as a member of the board of directors. It is understood that this arrangement is of Mr. Clergue's own making and that the group of industries will be worked out upon the original plans conceived by Mr. Clergue. Much attention has been directed to these allied industries by the recent violent fluctuations to which the stock has been subjected, but it is the opinion that the actual value of the properties is not disturbed. The Consolidated Lake Superior Co. possesses great assets, which must, with good management, become very profitable. Concerning these enterprises investigation by eastern parties convinces them that the Clergue plans have not been vague and extravagant, but precise and thorough, and that the company is a well-rounded whole which it requires but a short time to bring into entire harmony and reasonable success. The basis of the enterprises at the Sault are the vast water power of Lake Superior and the enormous grants of land and cash by the dominion and provincial governments. Lake Superior as a source of power is unique. Its water is the purest and clearest known, an important factor in pulp and paper making. Then there is never any considerable fluctuation of the lake level, so that power is constant and steady. By its ownership of riparian rights along the banks of St. Mary's river, on both American and Canadian shores, for miles above and below the rapids, and by agreeing with national and state authorities, the company has a practical monopoly of this water power, which is one of the greatest in the world. In the way of lands it has already earned and selected about 1,800,000 acres and has a right to select about 8,000,000 acres, which will be earned and taken as fast as may be. This land is not a barren waste, but is covered with splendid forests of pine and spruce, maple, birch, oak and other woods, and is, when cleared, well adapted for farming. Much of this tract is mineralized, and many deposits of copper, iron and gold are known to exist therein, though how large and rich they are is not yet established.

A catalogue of the industries established and in operation, and those about to wheel into line, will not be very lucid without explanation. These industries include paper pulp, of which 150 tons are made daily. The mills are sold ahead for a long time. They also include the Algoma Central and Manitoulin & North Shore railways, both of which are earning good interest by the transportation of mineral and forest products, and both of which are to be extended to important connections with mines and railroads. There are machine shops and foundries, splendidly equipped and very busy, and able to turn out work of large size and intricate character. There are blast furnaces and steel works, about ready for operation, and built on modern plans in the most substantial way. There are saw and veneer mills, just started and now earning a large sum. There are nickel, copper and iron mines in operation whose product is either sold or is used in the works for finished material. There are sulphur reduction works, employing methods singular to this company, for the elimination and saving of sulphur from nickeliferous pyrotite ores, and there are mills for the treatment of the resulting ferro-nickel in preparation for the blast furnace, where it will be made into an alloy suitable for steel making. There are car shops, brick yards, street railway and ferry lines, steamships for both passenger and freight traffic, and numerous other enterprises of more or less importance.

Three years ago chemists of the company were studying the problem of treating the nickeliferous pyrotites so that sulphur therein contained might be freed and saved for use in the proposed sulphite pulp mill. It was a problem that metallurgists did not consider practicable, but Mr. Clergue needed a sulphite liquor and had ores containing sulphur, and he thought a way might be found by which one could provide the other. Today the way has been found and now works for doing this are in actual operation. It has taken years of experiments and vast sums of money to make the thing possible, but its benefits should be great. Eliminating the combined sulphur in roasters there resulted ferro-nickel, an ore containing iron, nickel and silica. Mixed with sufficient high phosphorus hematite ore to bring the nickel proportion to the right percentage, and smelted in a blast furnace, preferably with charcoal for fuel, there is an iron that is ideal for the manufacture of armor plate steels. There are today piled up at the blast furnaces about 4,000 tons of this ferro-nickel ready for just that work. Contracts are about closed with leading English steel makers and ship builders for the sale to them of 50 tons of this pig iron at a price that, when announced, will seem tremendous, even in these days of costly iron and

steel. Officials of these English works are now on their way across the Atlantic to inspect the plants at the Sault and close the contracts. The hematite ore for this contract will come from the company's Helen mine, 120 miles north of the Sault on the shore of Lake Superior. This mine will produce this year about 300,000 tons of ore, all of which has been taken by these works or sold in Canada and the United States at a profitable price.

The pyrotite for this mixture comes from mines owned by this company in the famous Sudbury district, 100 miles east of the Sault, whence come a considerable portion of the world's supply of nickel. Ores mined in these mines are hand-picked to sort out the copper, and part goes to the ferro-nickel reduction works, while the rest is roasted at Sudbury and treated at Sudbury. A copper bessemerizing works is now under construction, the final plant of the complete chain, which is to treat the copper ores, and from this a daily production of from 15,000 to 20,000 lbs. of copper is expected during the year.

The present blast furnace plant consists of two charcoal stacks, each of a daily capacity of 150 tons. No. 1 is so nearly ready that fires to dry it will be lighted within two weeks and it should be in blast as soon as ore and fuel can be collected from the mines and kilns. Its great machinery is all in place and its docks are equipped with the most modern and approved devices for unloading cargoes and charging the stack. The cost of these furnaces and their steel mill has been more than \$4,000,000, and nothing has been spared to add to their efficiency in operation. Hulett automatic unloaders are in readiness for taking the ore from vessels and patent mixers will be used to receive the molten iron for the converters. The direct process will be employed and ore will not get cold from the time it is put into the furnace stack until it is rolled out the far end of the mill, half a mile off, a perfect steel rail.

The charcoal for these furnaces comes from the company's lands. Already fifty-six ovens are running and since beginning work have been selling coal to Michigan furnaces at a profitable figure. They will now supply fuel to the Sault furnace. These ovens are out in the timber, on the line of the Algoma Central road, and they consume 150 cords of wood daily. The largest chemical plant in America for the carbonization of wood is just completed at the Sault and ready to begin work as soon as the furnace requires it. This plant consumes 160 cords of wood daily and saves all the products of combustion. Connected with it are immense works for the production of wood alcohol, tar, acetate of lime, etc., which are by-products of the distillation of wood. This mill will produce a larger supply of these articles than any in this country. These works are also completed and ready to run.

Covering the company's great land grants are forests of pine and hardwoods. The former goes to a sawmill recently completed, and now turning out 110,000 ft. of lumber a day, lumber of such a character that it sells, mill run, for \$23, duty free, per thousand. The pine on this company's grants is of a high grade permitting this unusual price. There is in sawmills a large amount of waste wood. It is usually found too expensive to save and sell this, and costly burning devices are constructed for its destruction. At the Sault the pulp and other mills of the company require much steam, for drying and other purposes. This sawmill refuse is chopped up with great masticators, dropped into railway cars and carried to the furnaces where it is fed automatically to boilers, thus affording the sawmill an added profit and cutting the cost of fuel in two, as well as saving a by-product that would in most places go to waste. The disposition of this waste wood is typical of the character of the industrial operation, and of the care and thought shown in all details, not alone in sawmilling but in everything else. Instances of the same character are common in these enterprises.

Along with the small timber in the land grants are splendid specimens of maple and birch, great trees that it would be a shame to burn for charcoal or to chop up for cheap uses. To save these and make the best out of them a veneer-cutting mill has just been finished and is now in successful operation. It is the first of its class in Canada and is a large mill. Its cost was about \$100,000, and it is estimated by the manager that it will earn net per year, charging full price for the timber and the transportation, more than \$125,000. It is already full of orders for a long time ahead from makers of furniture, pianos, etc., and it is making a most beautiful grade of curly birch and birdseye maple. Later, clear spruce and cork pine will be made into veneers in this mill, and their value per 1,000 ft. indefinitely multiplied.

These are the chief investments of this company, which is stocked for \$30,000,000 in preferred and double that amount of common stock. There are in addition many smaller operations that are either in successful operation or nearly ready to go into use. All these interests are in Canada, where the land grants and subsidies of the company compel them to be, and where the natural resources are located. On the Michigan side of the Sault river is the larger power canal of the company, under the name of the Michigan Lake Superior Power Co., whose stock is held by the Consolidated Lake Superior. In the erection of the canal and its power house, stretching for a quarter of a mile along the river, six years' time and \$6,500,000 have been spent. This canal will begin earning the coming summer, when works that have leased a large part of its water will be ready to oper-

ate. These works are owned by independent companies, who are attracted to the Sault by the inducement of cheap power.

The investments for plants, etc., have been as follows, in round figures: Transportation interests, including 106 miles of the Algoma Central in operation and grading for 99 miles more, 15 miles of the Manitoulin & North Shore Railway in operation, six steel freight ships, three passenger steamers and several smaller vessels, a total of \$9,500,000; blast furnaces, steel mills, etc., \$4,500,000; mining properties, \$1,100,000; pulp mills, \$1,000,000; ferro-nickel works, \$500,000; Michigan canal, \$6,500,000, of which \$3,500,000 were secured by the sale of bonds on this plant; sawmills, buildings, real estate, etc., about \$800,000, against which there are bonds of \$160,000; material, etc., \$3,000,000. The buildings are steel, concrete and stone, and many are fireproof, while all are well built and most substantial.

PROMISE OF MORE GRAIN FOR DULUTH.

Duluth, Minn., April 8.—Duluth feels absolutely certain now of direct and very important new railway connections that will aid materially to the grain business of the port. The announcement has been made that the Soo line is to build at once north from Glenwood, a small station west of Minneapolis, to the Manitoba line. The Soo is a Canadian Pacific subsidiary line, and at the Manitoba line will be met by lines tapping that great system with all its feeders through the vast territory of western Canada. The Soo is going there for the grain trade and to give the Canadian Pacific another outlet. Its lake connections are 400 miles east of Duluth, at Gladstone, and the only way it has of reaching Gladstone is by swinging south to Minneapolis and then northeast to the lake. But the new line from Glenwood north will cross the Great Northern's main east-and-west line only 100 miles west of Duluth. The Soo, in other words, will have to haul wheat 600 miles from that junction point to its present lake terminals, as against 100 miles of the Great Northern to reach the lakes at Duluth. This condition, of course, must be changed by a direct line from its Glenwood-Manitoba extension to Duluth or it will get no more wheat than it can carry to mills at Minneapolis.

But the argument is strengthened by the present situation of the Northern Securities roads, Northern Pacific and Great Northern. Ever since the Northern Pacific sold its feeders in Manitoba to the government, which turned them over to the Canadian Northern, it has been anxious to get back. For two years it has tried unsuccessfully to secure rights to build in Manitoba. Within the past few days a bill granting these rights has passed the Manitoba legislature. Now this bill, on careful perusal, is not a Northern Pacific bill, but a bill permitting both it and the Great Northern all the connections they can ask with Manitoba. The Northern Pacific reaches the boundary from the south at but one point. The Great Northern has five branch lines running north from its main lines and ending either at the boundary or a few miles south of it. The new charter of the "Manitoba Midland," as it is to be called, permits it to connect at the boundary with any one of these half dozen roads, or with others. Now the Manitoba Midland will act as a system of feeders for the Northern Securities roads, which will bring all their surplus wheat to the head of the lakes.

This gives all the Canadian grain roads a connection with Lake Superior at the head of the lakes and leaves the Canadian Northern to haul its wheat to Port Arthur, a longer rail haul by 104 miles than a connection to Duluth. The Duluth, Virginia & Rainy Lake will connect this city and the Canadian Northern this year and cut off just 104 miles in the run from Lake Superior to Winnipeg. It is reasonable to suppose that much of the Canadian Northern's wheat will take this cut-off and reach deep water at Duluth when the other lines are in position to make rates.

AN IMPORTANT COMBINATION.

The Wellman-Seaver-Morgan Engineering Co. of Cleveland and the Webster, Camp & Lane Co. of Akron have combined under one management. The Cleveland company was organized in 1896 and has been unusually successful. It is now erecting a large plant at Giddings avenue and the C. & P. Ry., Cleveland. The specialties of the company are the establishment of Bessemer and open-hearth steel plants, rolling mills, metallurgical furnaces, the building of bridges and steel structures and the designing of coal and ore handling machinery. Notwithstanding its extreme youthfulness it is designing and building plants from Sault Ste. Marie to the orient. The Webster, Camp & Lane Co. has done an extensive business in general engineering, making of mining machinery and in establishing plants for the automatic handling of ore under the Hulett patents. Both enterprises were by nature fitted to be consolidated and this has been done. The officers of the new company are: President, S. T. Wellman; chairman of the board of directors, John McGregor; first vice-president, S. H. Pitkin; second vice-president, John W. Seaver; third vice-president, George H. Hulett; general manager, Charles H. Wellman; secretary, Thomas R. Morgan; treasurer, Albert D. Hatfield.

A TRAGEDY AT THE SAULT IN 1847.

Capt. John G. Parker of Ontonagon, Mich., is one of the few men living who has been identified with Lake Superior commerce since its beginning. He was asked by the Review a little while ago to relate his experience in going over St. Mary's river rapids in a row boat in 1847—a trip on which several of his companions were drowned. It was an especially stirring time at the Sault, as the schooner Uncle Tom was being hauled over the portage and there was much excitement in the little colony. Capt. Parker has replied to the request by the following extracts from his log:

"In the fall of 1846 laid up the schooner Fur Trader in Ontonagon river and on Dec. 6 (same year) Capt. Ripley, part of the crew, and myself walked through to L'Anse on the town line trail, a distance of 50 miles. Here Capt. Ripley wintered while I went through to Green Bay with the mail carriers, two white men. In going across Huron bay I broke through the ice but the mail carriers pulled me out. It was near night with a cold northwest wind blowing. We walked on a little way and made a camp, by cutting brush and wood. My clothes were frozen on me, but we soon got a good fire and supper. I had to sit up most of the night to dry my clothes; had some paper money in my pocket that I was taking to the captain's family in Illinois but it came out all O.K. The first man we saw was Charlie Ka-baw-gam at Carp river (Marquette); camped with him that night. The next man we saw was a Mr. Williams at Grand island, where we stopped for the night. In the morning we started on the trail for Bay-de-Noc; from there to Green Bay on the ice; from there staged it to Milwaukee; then home to Brookfield. We took a cutter from Brookfield, drove to the captain's home and delivered over the money to his wife.

"In the spring of 1847 left Milwaukee on propeller Genesee Chief—bound for the Sault. On arriving at the Sault went on board the schooner Swallow, Capt. Brown, to wait for the Fur Trader to come down from Ontonagon. The night before she came I dreamed I saw her coming down the lake under a heavy press of canvas and wind blowing hard from the northwest. She rounded to under our stern and came to anchor. Then I thought I saw a boat loaded with men leave her. When I looked again she went down out of sight. That startled me so I woke up. After breakfast Capt. Bunn and the mate went forward to smoke and I told them of my dream. About 8 a. m. we saw her coming down and she came to anchor just under our stern as I saw her in my dream. Went over to her in the yawl and saw Capt. Ripley. I waited for him to shave and get ready to go on shore. Capt. Bunn took his own boat and went on shore. After Capt. Ripley was ready we went on shore together. When we landed we found there Capt. Bunn, Capt. Stannard and a lot of men from the lower end of the portage. Capt. Bunn says to me, 'Come John, we are going over the rapids to sound the channel and try and run the Uncle Tom over.' I stepped into the yawl to pull the stroke oar and we started out. When we came to the first fall she took in some water. Just then I thought of my dream and I pulled off my boots. I knew then she would swamp. Capt. John Stannard was forward to pilot her down and Capt. Bunn steered her with an oar. When we got to the big falls she went over, filled forward, veered badly in the eddy and the water from the falls took her down stem foremost. She capsized and went down the river bottom up. When opposite McKnight's dock Capt. Brown and I got on her bottom; then Capt. Redmund Ryder took us off in his boat. The Indian chief of the Chippewas was out fishing for whitefish in his canoe and saw Mr. Seymour go down. He paddled over to where he saw him go down and pulled him up with his spear, took him over to the shore and laid him on the dock; and when they were rolling him to get the water out along comes little Duncan who cries out, 'rowl him, rowl him, be jabbers, he owes me tin dollars.' The engineer of the propeller Independence, Tom Richie and Porter, Wm. Flynn and Dr. Prouty we picked up down at Sugar island. This happened June 10, 1847—That afternoon, Capt. Moore of the schooner Merchant, in going ashore suffered a broken leg by the oar striking the dock. So he got Capt. Brown to take the Merchant up. She was bound for the Entry with seven passengers, seven of a crew and loaded with supplies. Capt. Brown took his boat, compass and glasses. She left the next day and never was heard from again."

Capt. Lawrence O. Lawson, for twenty-three years head of the famous Evanston life saving crew, which operates near Chicago, has failed to pass the physical test required of him, on account of failing eyesight, and will be retired. His successor will probably be Patrick Murray, who is No. 1 on the crew. Capt. Lawson took charge of the Evanston station in 1880 and was the first permanent captain appointed for the crew. During his service there the Evanston crew has a record of 487 lives saved. Perhaps the most noteworthy of their deeds was at the wreck of the Calumet off Fort Sheridan on Thanksgiving day in 1889, when eighteen lives were saved. Congress voted each of the men a resolution of thanks and a \$100 gold medal for bravery.

The Zenith Steamship Co., of which Mr. George A. Tomlinson of Duluth is manager, has purchased the steamer Yosemite from the Yosemite Steamship Co. of Duluth.

OFFICERS OF LAKE VESSELS.

Anchor Line, Buffalo: Steamers—Tionesta, Capt. Charles Christy, Mate J. H. Lehan, Second Mate P. McCarthy, Engineer John Wise, Second Engineer Edward Clark; Muncy, Capt. D. Ryder, Mate M. R. Hamill, Second Mate H. McKinnon, Engineer Fred Rehbaum, Sr., Second Engineer Maurice Murphy; India, Capt. H. O. Miller, Mate A. McKenzie, Second Mate R. Spurrier, Engineer Jno. H. Forrester, Second Engineer Edw. Stevenson; China, Capt. H. Cronkhite, Mate T. J. McGrath, Second Mate J. Black, Engineer Timothy Griffin, Second Engineer Wm. Erskine; Japan, Capt. Jno. Doherty, Mate P. J. Grant, Second Mate D. D. McLeod, Engineer William Wilson, Second Engineer Wm. Geottle; Codorus, Capt. A. McKenzie, Mate A. Nephew, Second Mate Jas. Griffin, Engineer W. J. Swain, Second Engineer Chas. Cray; Mahoning, Capt. J. Corcoran, Mate E. E. Loadwick, Second Mate H. Sellon, Engineer W. A. Black, Second Engineer Edward Sohn; Schuylkill, Capt. Chas. Nelson, Mate Jos. Donohue, Second Mate Robert Rowan, Engineer John Jordan, Second Engineer John Metke; Susquehanna, Capt. L. Wright, Mate A. L. Cuthbert, Second Mate S. Leroy, Engineer Albert Edgar, Second Engineer Andrew Dayton; Clarion, Capt. F. Bloom, Mate J. F. Pardee, Second Mate A. McLeod, Engineer Fred Rehbaum, Jr., Second Engineer Wm. Constable; Lehigh, Capt. E. Martin, Mate L. Wilson, Second Mate J. J. Powers, Engineer William Garrity, Second Engineer J. Rehbaum; Alaska, Capt. F. F. Williams, Mate E. Caulfield, Second Mate Guy Taylor, Engineer A. D. Birdsall, Second Engineer W. Shaw; Cone-maugh, Capt. Geo. J. Delaney, Mate J. H. Dodds, Second Mate Chas. Cotter, Engineer Charles Hull, Second Engineer Geo. Rankin; Lycoming, Capt. M. Boggan, Mate J. McGillivray, Second Mate P. C. Farrell, Engineer Chas. Allender, Second Engineer John Erskine; Conestoga, Capt. H. Casey, Mate J. H. Gallagher, Second Mate D. Murphy, Engineer A. E. Welch, Second Engineer W. Greenwood; Delaware, Capt. Jno. McDonald, Mate E. Harrington, Second Mate C. Graham, Engineer John Healy, Second Engineer Geo. Smith; Juniata, Capt. Chas. Olsen, Mate C. Murphy, Second Mate, ———, Engineer John Clark, Second Engineer Thomas Stamp; Wissahickon, Capt. T. J. Bell, Mate Chas. Ernest, Second Mate A. J. McPherson, Engineer A. B. Fraser, Second Engineer Robt. Watts.

Union Steamboat Line Buffalo: Steamers—Starrucca, Capt. Walter Robinson, Engineer John Laehy; Ramapo, Capt. J. H. McDonald, Engineer H. Johnson; Chemung, Capt. F. B. Huyck, Engineer C. Coushaine; Owego, Capt. John Dugan, Engineer E. Hull; Tioga, Capt. John J. Wulke, Engineer W. Hayes; Binghamton, Capt. Geo. T. Morris, Engineer J. C. Tennant.

Boland, John J., Buffalo: Steamers—Congress, Capt. David O'Hagan, Engineer Lawrence Brown; John Pridgeon, Capt. John O'Hagan, Engineer H. Mallon; Westford, Capt. H. H. Jex, Engineer Geo. H. Blinby. Schooners—Massasoit, Capt. Chas. Keenan; John Magee, Capt. Samuel Travis.

Lake Erie Transportation Co., Cleveland: Steamers—W. S. Mack, Capt. John Hollingshead, Engineer John W. Lowe; P. P. Pratt, Capt. Jos. Lowes, Engineer Wallace Tomey. Schooner—Athens, Capt. Geo. Mackie.

Mack Steamship Co., Cleveland: Steamer—Wm. Henry Mack, Capt. A. J. Greenley, Engineer H. L. Witter.

Richardson, W. C., (representing estate of Valentine Fries, Milam, O.) Cleveland: Steamer—Wm. Edwards, Capt. Jas. LaFramboise, Engineer Moses Blondine. Schooner—Golden Age, Capt. D. H. Stalker.

Hand & Johnson Tug Line, Buffalo: Tugs—C. F. Dunbar, Capt. John Whalen, Engineer James Byers; W. G. Mason, Capt. John Farrell, Engineer John O'Connor; Cascade, Capt. James Gray, Engineer William Miltner; F. W. Gee, Capt. James Fontaine, Engineer William Whalen; R. H. Hebard, Capt. James Hazen, Engineer Joseph Whalen; Grace Danforth, Capt. James Doyle, Engineer James O'Reilly; W. I. Babcock, Capt. H. H. Vroman, Engineer Thomas Ryan; Conneaut, Capt. Joseph C. Lawson, Engineer Root Mason; E. C. Maytham, Capt. Alonzo Linn, Engineer George Gristman; Alpha, Capt. Joseph Green, Engineer Henry Bullard; Tonawanda, Capt. A. Booth, Engineer W. F. Kropp.

DULUTH ITEMS.

Duluth, Minn., April 8.—No more demand for grain carriers than there has been for some time past, but owners are not pressing their ships for loads. Very little wheat is chartered from Duluth but from Port Arthur and Fort William practically all that is in store—about 6,000,000 bu.—is chartered for shipment and will go forward as fast as possible after the opening of the Canadian ports. Some flax is chartered from Duluth and about 2,000,000 bu. oats and barley. Receipts of wheat for the winter at the Canadian ports have been less than expected, chiefly on account of lack of rolling stock and elevator capacity, though the latter is not filled. There is still a great deal of grain in the Canadian northwest and it will be coming forward all summer in considerable volume. Flour warehouses at the head of the lakes are filled, and the Great Northern ships are loading for Buffalo delivery.

The Northern Pacific road has closed contracts with Knudson & Eden for all its stevedore work in Duluth and the firm will

employ from 300 to 500 men the season through. This work includes the handling of flour at the old St. Paul & Duluth docks, as well as all east and west bound merchandise on the Northern Pacific docks.

The Duluth, Zenith and Superior steamship companies have increased their capital to \$275,000 each, for the purpose of taking on vessels now under construction for them. These are all George A. Tomlinson companies. Associated with Mr. Tomlinson are prominent coal, grain and ore people.

CANADIAN MARITIME NOTES.

The dominion government has decided to impose steamboat inspection dues and fees upon steamboats arriving from any port in the United States at any port in Ontario. Canadian vessels are subject to inspection dues and fees in United States ports, and fees were charged on Ontario steamers in 1902, although United States vessels were not subject to such fees in Ontario ports.

Commissioners appointed to inquire into the dry dock question at Montreal are considering the propriety of recommending the purchase of the desired floating dry dock at Hamilton, Bermuda, owned by the British admiralty as a temporary measure. The extreme length of this dock is 381 ft., and it has a depth of 25 ft. 9 in. on the sills.

The Canadian Pacific Railway Co. began taking over the vessels of the Beaver and Golder-Dempster lines as they arrived in port at St. John, N. B., and Liverpool, London, and Bristol, England, after April 1. F. Marshall, who represented the Beaver Line in Liverpool, Eng., has been appointed European passenger manager for the company.

The New Ontario dock at Sault Ste. Marie, Ont., is nearly completed. It has a frontage of 30 ft., a length of 200 ft. without approaches, and there is a depth of 21 ft. of water alongside. The need of additional dock accommodation on the Ontario side of the river has long been felt.

Preparations are being made at the Britain ship yard, Toronto, for laying the keels of the two new steamers for the Richelieu & Ontario Navigation Co. One steamer will be a duplicate of the burned Montreal, but the details of the other have not been completely settled.

The Royal Marine Insurance Co. of Canada has been organized at Montreal with the following directors: A. A. Allen, J. A. Hodgson, D. W. Campbell, J. W. Molson, T. Harling, J. B. Tresidder and J. S. Bennett. Mr. Bennett will be general manager and underwriter.

The steamer Lincoln, formerly on the Toronto-St. Catherines run, and last year engaged in freighting between Sault Ste. Marie and Thessalon, Ont., has been sold to Pelee island owners, who will operate her on Lake Erie between the island and the mainland.

The new Canadian Pacific steamer Princess Victoria arrived at Victoria, B. C., from Newcastle-on-Tyne, Eng., after a passage of fifty-nine days. Her average speed was 13 knots. She is said to be capable of making 19¼ knots.

The Quebec Steamship Co. has elected the following directors for 1903: Hon. P. Garneau, D. C. Thomson, J. C. Thomson, A. F. Hunt, W. Simons, G. T. Davie, W. Price of Quebec; L. H. Botterell and M. N. de Lisle of Montreal.

The proposed amalgamation of the various lines operating steamers on the St. John river, New Brunswick, has not been brought about, and it is not likely that anything further will be done in that direction this year.

The New Brunswick legislature has voted the usual subsidies to coastwise steamers for the current year and has added one to the new line opened from St. John to Halifax via Yarmouth and south shore ports.

Sir Louis Davies, who was minister of marine and fisheries in the dominion cabinet from 1896 to 1902, has been presented by the heads of the departments with a group photograph as a memento.

The Grand Trunk Ry. Co. proposes establishing a transatlantic line of its own, but nothing is likely to be done in that direction for some time unless the company's hand is forced.

The Lardner Bros. have had built at Malone Bay, N. S., a large wrecking barge for use on the Newfoundland coast. The barge will receive her boiler and engines at Halifax.

O. A. Ham, ship builder of Mahone Bay, N. S., has made an assignment for the benefit of his creditors. The amount involved is not large.

Capt. McNaughton, who had been sailing on Lake Ontario for fifty years past, died at Toronto, recently.

While being towed up Chicago river, this week, a swift cross-current caught the steamer Donneconna and the tow lines were snapped. The boat was under considerable headway at the time and before her momentum could be checked she had crashed into the Union liner Caemung, lying at the dock, head on. The Chemung was immediately towed to dry dock in the north branch, where it was found that the plates for 30 ft. on the port side would have to be replaced. A dozen frames and stringers were also broken. Repairs will take six weeks and will cost \$10,000.

STEEL CORPORATION AND THE ORE RAILWAYS.

The reasoning of Attorney general Douglas by which he decided that the State of Minnesota could not prosecute the United States Steel Corporation for merging the iron range railroads is of peculiar interest in view of the vital difference, as Mr. Douglas points out, between the way the Steel Corporation holds its control of these railroad properties and the method of procedure adopted by the Northern Securities Co. The attorney general of the state of Minnesota, as a result of a senate resolution instructing him to make an investigation, has rendered an opinion in which he says that the merger of the ore roads violated the spirit of the state law but he doubts if this is true of the letter of the statute and is unable to find that the state has any remedy under which it can interfere. The roads referred to are the Duluth, Mesabi & Northern, acquired by the Lake Superior Consolidated Mines, which has since been absorbed by the Steel Corporation, and the Iron Range Ry., of which the Steel Corporation obtained possession through the Federal Steel Co. The opinion is as follows:

"Substantially all of the capital stock of the Duluth, Mesabi & Northern Ry. Co. was acquired in 1893 by the Lake Superior Consolidated Iron Mines, a New Jersey corporation, and that in 1901 the United States Steel Corporation, a New Jersey Company, was organized and on May 24 acquired substantially all of the capital stock of the Lake Superior Consolidated Iron Mines. Since the construction of the road by the Minnesota Iron Co. the stock of the Duluth & Iron Range has substantially all been held and owned by the Minnesota Iron Co., a Minnesota corporation. The stock of the Minnesota Iron Co. was in 1898, with the exception of a sufficient amount to qualify directors, acquired by the Federal Steel Co., a New Jersey corporation, and in turn substantially all of the stock of the Federal Steel Co. was, on April 2, 1901, acquired by the United States Steel Corporation.

"It does not appear that the United States Steel Corporation is the owner of the capital stock of any company organized under the laws of Minnesota, and I am unable to find, after an exhaustive examination, that it is the owner of any real or personal property, the situs of which is in Minnesota. It therefore appears that the United States Steel Corporation, while it has purchased the power of control in the manner above indicated, of each of said railway companies, is not the owner of any of the capital stock of either; neither is it the owner of any property of any nature whatsoever situated within Minnesota and has not appointed an agent upon whom the service of process may be made in Minnesota; nor is it doing business therein.

"Independent of the question whether the United States Steel Corporation by becoming the owners of the stock which controls the two lines of railway referred to offend the provisions of our statutes, I am clearly of the opinion that inasmuch as it appears that the steel company is not engaged in business in Minnesota, or the owner of any property situated therein, under the settled rule adopted, not only by the supreme court of the United States, but of the supreme court of Minnesota, jurisdiction cannot be obtained in the courts of Minnesota over said company. On the other hand, under the decision of the supreme court of the United States in *State of Minnesota vs. Northern Securities Co.*, the supreme court of the United States is without jurisdiction, for the reason that railroad companies above referred to would be necessary parties, and being organized under the laws of Minnesota that fact would bar the supreme court from assuming original jurisdiction. Again, the railway companies in question being necessary parties, the fact that they in turn are not doing business in New Jersey and are not the owners of property situated in New Jersey would bar the State of Minnesota from obtaining jurisdiction in any action brought in the courts of that state against the United States Steel Corporation, the Federal Steel Co., the Lake Superior Consolidated Iron Mines and the said railway companies.

"Assuming, for the sake of argument, that an offense has been committed against the laws of the State of Minnesota, it follows under our dual system of government and under the uniform line of decisions above referred to of the United States supreme court that jurisdiction to test the question could not be obtained in any court in the nation. This peculiar condition was brought to the attention of the legislature at the special session of 1902, in a communication made to the governor which he in turn referred to the legislature, in which the propriety of additional legislation by congress or possibly, as I believe, an amendment to the constitution of the United States was suggested. An additional question fairly within the scope of the resolution is presented, to wit: Whether the laws of Minnesota have in fact been violated under the facts found to exist as above set forth.

"A vastly different question is here presented than in the litigation now pending brought by the State of Minnesota against the Northern Securities Co., the Great Northern and the Northern Pacific. In the latter a majority of the stock of each of said railway companies was consolidated in single hands, and it is claimed that the act of a majority of the stockholders is the act of the railway company; while in the former the stock of the railway companies was not pooled in single hands, and it

does not appear that the railway companies either by stockholders, officers or employes, have acted in any manner in consolidating the power of control of such railway companies.

I am inclined to the view that the United States Steel Corporation, in which is vested the stock of, and thereby the power to elect directors of the Federal Steel Co. and Lake Superior Consolidated Iron Mines, and indirectly through such companies to control the said railway companies, does not, by virtue of such ownership, to-wit, the purchase of the stock of two manufacturing companies, become a 'railway company or the lessee, purchaser or manager of any railway company' within the meaning of the act, and therefore cannot be deemed to have violated the prohibitory laws of this state. The spirit of the Minnesota act is violated, and if it could be shown that the United States Steel Corporation was a device created by the officers and stockholders of the railway companies for the express purpose of violating or evading our laws, another question would be presented. However, the facts that I am able to gather do not warrant this assumption."

AROUND THE GREAT LAKES.

It has been necessary to postpone the opening of the Welland canal until April 13 owing to a leak having developed in the flume of the rubber company at Port Dalhousie.

Capt. A. C. Congnodel of the steamer T. S. Fassett dropped dead at Buffalo Saturday while on his way to fit out his boat. His home was at North Tonawanda and he was seventy years of age.

Indications at Buffalo point to a lively tug war. Although no official announcement has been made, the towing company has decided to cut last year's towing charges in two at that port. The new tariff will be issued in a few days.

Capt. Ira Mansfield has been notified that he will receive the appointment as inspector of hulls at Chicago to take the place left vacant by the resignation of Capt. Charles A. Richardson. The position of inspector of boilers has not yet been filled.

With her pilot house, railing and stays covered with ice to the depth of 6 in. the steamer Luzon delivered the first cargo of coal of the season at Milwaukee on Saturday last. She left port before the strike of the firemen had been declared. Of course they forsook her at Milwaukee. She encountered heavy seas on Lake Huron but nevertheless made good time.

Following the appointment of Chas. B. Hopper as general freight agent of the Goodrich Transportation Co., Mr. H. W. Thorp, general manager of that company, announces that D. McMillan has been appointed general agent of the company at Milwaukee, having full charge of affairs, and W. P. O'Conner has been appointed assistant general agent at Milwaukee, in charge of office work and to act in Mr. McMillan's absence.

Before leaving Cleveland on Monday last, officials of the Licensed Tugmen's Protective Association, and the Tug Firemen and Linemen's Association met with representatives of the dredge concerns of the lakes and agreed to contracts for the coming season's work that are practically the same as those entered into with the Great Lakes Towing Co., and which were outlined in the last issue of the Review.

Two of the oldest masters of the Goodrich fleet of Lake Michigan passenger steamers, Capt. Stines of the Virginia, and Capt. Gallagher of the Indiana, have retired. Capt. Geo. Pardee will succeed Capt. Stines as master of the Virginia and will himself be succeeded on the Atlanta by Edward Taylor, formerly mate of the Indiana, while Elmer Redner is transferred from the Sheboygan to the Indiana. Capt. Albert Johnson, a new man in the fleet, will take the Sheboygan.

Capt. M. J. McNamara died at Detroit this week. He was one of the best known sailing masters on the great lakes. Capt. McNamara was born in Ireland, and came to this country about forty years ago. He first shipped from the port of Hamilton, Ont., on the old schooner George Foote. He sailed many vessels during his life time. He moved to Detroit about ten years ago from Toledo. The remains will be interred at Toledo. He was sixty-eight years old.

The Georgian Bay Navigation Co.'s steamer Pittsburg was sold under the hammer at Owen Sound, Ont., last Thursday and was bid in for \$25,000 by the Detroit Savings bank which holds a chattel mortgage on the vessel. The Pittsburg with the steamer City of the Straits, under charter from the Detroit & Cleveland Navigation Co., were on the route between Toledo and Georgian bay ports and the Sault last season. The season was not profitable and it was because creditors refused to grant extensions that the steamer was sold.

Minority owners of the steamer America have applied in the courts at Buffalo for the appointment of a receiver for the vessel. It is claimed that the management of the vessel has been characterized by wastefulness and that the earnings during 1902 were only \$2,050. The plaintiffs want the boat sold and the proceeds divided among the owners according to their interests. As it appeared during the arguments that the plaintiffs had offered to sell the vessel for \$105,000 while the defendants had offered \$100,000, Justice Childs said that if the defendants did not pay \$102,500 to the plaintiffs for the vessel by next Monday he would appoint a receiver.

BELOW THE WATER LINE.

(Extract from an Article by Benjamin Brooks in Scribner's Magazine.)

The work of eternally pushing the old ship on past the meridians, the race against time and the sun and the interest on the money, begins in the gloomy stokehold. You have heard that the stokehold is hot, and when you have clambered into it over disorderly piles of still smoking ashes, steadying yourself by taking incautious hold of burning handrails, and stand for the first time face to face, with the furnaces, you feel assured of the fact. But besides being hot, it is the most active, interesting part of the ship. It is her whole life. You must spend years studying it before you can stand there in command of your watch with your hand on the feed check-valves, your eyes on everything in general, and keep the steam up where it belongs in spite of the ravenous engines sucking it away from you; years before you can tell, in one swift glance, whether a fireman is burning the greatest possible amount of coal per hour in his fires with the least amount of waste. The problem is this: under a certain large quantity of water, which is continually changing, build thirty fires; and by means of them, notwithstanding they must all be continually replenished with fresh coal and freed from ashes, keep it at a perfectly even temperature (within a very few degrees) day and night for an indefinite period. The game is the more interesting because a ship can never afford to spare more than just barely enough space for her propelling machinery; consequently everything—engines, boilers, furnaces,—must be worked to the very limit of their capacity. The game goes as regularly by turns and in cycles as progressive whist. Starting with a few fires first in order, the doors are opened to admit a few shovelfuls of coal thrown quickly into the front of the furnaces, then closed again as soon as possible lest too much cold air should enter. As soon as they are closed the fires next in order are served the same way, and then a third group. Next the "green" coal in the first fires is raked back through the furnaces to complete its combustion. After another short interval it is necessary to "slice" them—that is, probe them with long pointed bars to lift the clinkers from the grates and make air-passages. Finally, it is time to stoke again.

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Nobody who has not been to sea can imagine all the things that can happen to a ship's machinery nor properly estimate the cleverness and ingenuity used up in repairs. The youth who leaves his shop full of wonderful and costly machines has another complete education waiting for him at sea in the wonderful things that can be accomplished in time with a plain, ordinary hammer and chisel, a rather worn-out file, and a great deal of ingenuity. I should like to have been aboard that steamer disabled in the Red sea, where they took a boat davit, straightened it out in a rivet forge, made a new boiler feed-pump piston rod out of it, and went on again—or, better still, on the ship that lost a propeller and the end of her tail-shaft off the west coast of Africa—to replace which they were obliged to move her cargo, pump her forward compartments full to sink her bow and raise her stern out of water, drag the broken shaft, several tons in weight, out through the long alley (too low and cramped to stand up in), plug up the hole behind it, drag in the spare shaft and couple it up, and lower the new propeller down over the stern—all while she kicked and wallowed in a heavy sea—and finally had to lower the chief engineer over after the propeller, where he sat tied to a flimsy staging making all fast and secure while the vessel jounced him up and down in the sea till he bled at the nose and ears, and the crew kept the sharks at bay with pistols and boathooks to prevent them from eating him up before he finished the job. That was a seventy-two hours in which the young and aspiring engineer might learn a host of valuable and interesting things!

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A little army of us rose and worked and slept again, as though our existence was timed to the revolutions of the engine. Every man had his place and his function as if he were a certain cog in a certain wheel of a clock. We were all, like Gaul, divided into three parts or "watches." The first worked from midnight till 4 A. M., the second from four till eight, the third from eight till noon. Then came the first again from noon till 4 P. M., and so on till the twenty-four hours was complete—which gave each man eight hours of work and sixteen of leisure each day. At the end of each four-hour period a gong was sounded, and immediately the next crew who had been waiting along the gloomy 'tween-decks gangways, knocked out their pipes, appeared on the gratings above us, grasped the slippery railings of the stairs and with their feet stuck straight out before them, slid down to the very bottom of the ship like so many firemen down a pole. The engineer in charge of the watch went forward into the stokehold, looked at the steam gauge, noted the height of water in the boilers, peered unflinchingly into the blinding furnaces, counted his stokers, and finally nodded to the engineer who had preceded him to signify that all was well. The engineer second in charge took his stand in the engine-room, looked at his gauges, noted the figures on the revolution counter, the temperatures of the engine-room, of the thrust bearing (which receives the thrust of the

propellers to drive the ship ahead) and even of the seawater itself through which the ship was moving. He noted the depth of water in the various compartments, listened for any unusual squeaks or knockings, asked for any special orders from the chief and finally took charge. Each greaser, as soon as he had shed his coat and rolled up his sleeves, went rapidly about touching every one of the several bearings for which he was responsible to see that they were cool and in good order, looked into the oil boxes to be sure they were properly filled; then, by a nod of his head, assumed responsibility for the next four hours.

Finally, in return for all these many little hardships there is no glory. You passenger folk are always so much obliged to the captain for your quick passage instead of us who brought him in ahead of time. You think of him as a great navigator because he allowed you in the chart-room, but of us who did a hundred things for you to make you comfortable—give you warm salt water baths, and made you ice, kept the drinking water fresh and your lights burning brightly, and expended all that persuasive profanity in the stokehold—you think nothing at all. At the end of a record-breaking passage the captain opens the box of cigars, but while the race is being run, and the rival steamer is close behind with foam at her bow and black smoke pouring out of her, the black man with the shovel is the all-important one. "Hi there!" comes the shout down the fidley hatch, "shake her up; she's gaining on us! No more grog down there for you fellows if I can read her name with the glass tomorrow morning."

* * * * *

All good old chiefs love their engines and come to believe in them as McAndrew did. To all of us assistants and 'prentices they were not the mere machines that they appear to the outsider, but quite human. Every noise they made, every motion, every trick they had we knew and had the reason for it. Kipling speaks of the marine engine as the most sensitive thing man ever invented. There's a sort of cold, lifeless, though admirable, precision in a telescope, and a fine regard for details in a phonograph, but the marine engine is alive; it strains and labors desperately, it groans with rheumatism in its joints, screams with the pain of tight bearings, staggers and plunges against the oncoming seas, gets out of breath and runs away with itself, trembling like a frightened horse.

SPRING AND THE IMPROVIDENT SAILOR.

New York, April 8.—Spring has arrived according to the calendar and we have the yearly recurring activity among boarding house keepers to have a supply of sailors for the expected demand. Around the shipping offices there are always a few nautical Ciceros who eloquently describe the pleasure of sailing the great lakes, resulting in many men leaving New York, and requesting the conductor to put them off at Buffalo. Yachts of all sizes and descriptions, more numerous this year than ever before in the history of the port, are now about ready to ship crews, and the old hands, men who have been waiting all winter for just this chance, are ready for a berth. Tow boats that have been in ordinary all winter now reappear newly painted, and a large fleet of lumber vessels, so-called Machias fruiters, too old and decrepit for winter sailing, are all in need of sailors for the summer's business.

It is at this time of year that the captains of the deep water sailing ships, when venturing to demand a crew, is requested to bring his scow along "that we may have a look at her," while the boarding masters, or those who have cornered the market in sailors, exact \$10 to \$15 per man from the ship owner. The so-called "crimping" is on the wane and it is now only the improvident and dissipated sailor who cannot select his ship and decide for himself to which country to sail. Those seafarers, however, who land in New York without money or clothing are often only too glad to accept the "hard-up" boarding master's hospitality, and upon their promising to take "the first chance" shelter and food are assured them in this wilderness of streets. Herded together like a flock of sheep, closely watched by the "boss" and his "runner," the unfortunates are daily rounded up before a shipping office until some captain, knowing the scarcity of the supply at this time, consents to pay the famine price. A sailor thus shipped is never told the hour of his vessel's departure and remains practically a prisoner under the roof for whose shelter he so dearly pays until he is conducted on board the tug that has been engaged to tow his craft to sea. He receives from the boarding house keeper a little clothing some more prosperous confrere left behind, and this with the few meals he received while in the house cost him one month's wages. The \$10 or sometimes \$15 which the boarding house keeper charges the ship owner for each man he so kindly furnished, is clear profit, and the term "hard-up" boarding house is seldom in reference to its owner. Anyone having ever observed the disgraceful traffic in improvident, dissipated and irresponsible mariners, will be pleased to hear that a "free" shipping office has at last been established. A captain who for years sailed from New York said this morning that it cost him 20 cents to ship four men, and said 20 cents he gave voluntarily to defray his men's car fare.

FINE NEW SHIP FOR OLD DOMINION LINE.

Newport News, Va., April 8.—The palatial passenger and freight steamer Monroe has been turned over by the ship yard to her owners, and it is reported that as soon as the new ship is tried out the Old Dominion Steamship Co. will award contracts for two more vessels after the same design to the Newport News company. The Monroe, in construction, equipment and finish, is a splendid steamer. Complete and ready for service she cost about \$700,000. When the Monroe left the ship yard and dropped down to the Old Dominion pier, she was followed in the slip by the steamer Richmond, the oldest of the ocean steamers on the line. The contrast was marked between the newest and oldest. The Monroe sailed for New York Sunday on her maiden voyage. Officials of the Old Dominion company, the ship yard and railroads with which the line connects being passengers. No expense was spared in the building of this vessel. Nothing was omitted that would add to the comfort of passengers, officers or crew, or that would facilitate the handling of freight. The conveniences and luxuries of a first-class transatlantic liner were installed. The contract for the vessel was signed March 1, 1902, and the contract date of completion was June 1 next. The ship yard has, therefore, turned the vessel over to her owners two months ahead of the time. C. E. Carlton, chief engineer of the Monroe, superintended her construction. Capt. J. G. Hulphers, master, was here for some time looking after matters pertaining to the fitting out of the ship.

This newest addition to the Old Dominion Line was built for service between Newport News, Norfolk and New York. Dimensions are: Length between perpendiculars, 344 ft.; length over all, 366 ft.; beam, molded, 46 ft.; depth, molded, 37 ft.; depth to main deck, 28 ft. 6 in.; depth to lower deck, 19 ft. 6 in.; depth to orlop deck, 10 ft. 6 in.; mean draught, 18 ft.; gross tonnage, 4,704. The ship will carry 1,550 tons dead weight cargo, exclusive of coal, water, passengers and stores. There is 210,000 cu. ft. of cargo space under the deck beams. The fresh water tanks have a capacity of 25,000 gallons. The capacity of the coal bunkers is about 250 tons. There are five decks all told, orlop, lower, main, hurricane and shade. The propelling machinery consists of a single engine of the triple-expansion, inverted-cylinder, direct-acting, surface-condensing type, with cylinders of 33, 52 and 84 in. diameter and common stroke of 54 in. The propeller is a right-hand, four-blade screw of sectional type. There are six Scotch single-ended boilers, each 10¾ ft. long and 174 in. in diameter. They are designed for a working pressure of 175 lbs. The estimated horse power is 4,600. All of the deck houses are of iron, this being a new departure on the line.

Another departure and one that will prove popular with the patrons is the location of the large dining saloon forward on the hurricane deck. The dining saloon is luxuriously fitted out and is equal in splendor and comfort to any on the transatlantic liners. The general color scheme throughout the ship is white and gold and it is richly in evidence in the dining room. The electric light fittings are green. The tables and revolving stationary chairs are in mahogany, the latter covered with costly tapestry in red effect. In the main saloons the stateroom paneling is in mahogany. The furnishings throughout are costly and elegant. There are seventy-two staterooms, with 275 berths, which are of the iron-pipe make. The quarters for officers and crew are elaborately furnished. The crew is probably better provided for than in any other ship on the coast.

LAUNCH OF THE ARMORED CRUISER WEST VIRGINIA.

Newport News, Va., April 8.—Elaborate preparations are being made for the launching of the armored cruiser West Virginia at the Newport News ship yard April 18. The battleship division of the North Atlantic squadron will be unable to reach Newport News in time for the event, but half a dozen smaller warships will be here and it is expected that the naval and marine turnout will be a special feature. Sailors from the German cruiser Gazelle will march in the parade that will follow the launching. A special steamer will arrive here from Washington on the morning of the launching bringing a large party of naval officers. Miss Katherine V. White, sponsor for the ship, will be escorted to Newport News by the governor and his staff and party, as well as the West Virginia legislature in a body. Five thousand visitors are expected from West Virginia alone. Fully 15,000 visitors are expected in the city and the launching crowd will probably number 30,000.

The German cruiser Gazelle is in dry dock at the ship yard undergoing an overhauling. The ship is of the unarmored class, nearly as large as the Vineta, but by no means as formidable in appearance. The Pacific coast lumber steamer Francis H. Leggett was given a successful dock trial at the ship yard a few days ago and will be given her builder's trial shortly. She will leave a few weeks hence on her long voyage to San Francisco.

The great boast of the Norfolk & Hampton Roads Ship Building & Dry Dock Co.—talk of a \$5,000,000 ship yard with a 1,000-ft. dry dock—has narrowed down to a single marine railway with a machine shop attached. This will be built at once, the promoters say. They also say that in a few years they expect to carry out their ship yard ideas.

SOME BOOK REVIEWS.

"How to Build a Launch From Plans" is the title of a book written by Charles G. Davis and published by the Forest & Stream Publishing Co., New York. In his introduction the author states that more than half the joys of boating are found in building and producing one's own boat by one's own labor and skill, or lack of it. The book will help to make the way smooth for the amateur. The coming of the launch has vastly widened the pleasures of life. It has made water sports possible to those who would not venture afloat in a sailboat. The book is written simply for the amateur and it carries him forward, step by step, to the completed launch. Every inch of the way is made quite clear by drawings. There is much instruction in the little work.

"Elements on Steam Engineering," published by John Wiley & Sons of New York is the joint production of H. W. Spangler, professor of dynamical engineering in the university of Pennsylvania, Prof. Arthur M. Greene, professor of mechanical engineering in the university of Missouri, and S. M. Marshall. The book is intended to bring before the beginner examples of the various forms of steam apparatus used in modern steam power plants, to explain simply and briefly the construction, use and reason for using these various parts or machines, and to give him a working vocabulary in this branch of engineering. The book is prepared, primarily, for first-year students in engineering schools, but it is hoped that it may be of use to the general reader and to the great number of young men in the manual training schools and institutes throughout the country. The work contains little theoretic matter, as, in most cases, these portions are taken in the latter part of a student's course and after he has become familiar with many machines. The chapters, of which there are nine, deal specially with boilers, boiler details and accessories, boiler-room auxiliaries, the slide-valve, steam engine, engine details, valve motions and diagrams, indicating and governing, governors and valves, and condensers and multiple-expansion engines.

The Forest & Stream Publishing Co., New York, has just issued from its press a book entitled "Small Yacht Construction and Rigging," by Linton Hope. The book is illustrated by two complete designs and numerous diagrams and details. The book is intended to be of assistance to those who wish to try to build their own boats. Boat building is one of the most fascinating hobbies a man can take up. If he has natural talent, patience and common sense there is no reason why, with a little practice, he should not be able to build a vessel which will be a credit to him. He must not, however, be discouraged, if at the beginning he only spoils wood and has to do the work over and over again till he can make a good job, and he should, therefore, before starting, make up his mind that he will do it right, even if he has to make half a dozen fruitless attempts. The chief maxims to be borne in mind in boat building are: Be sure that all your measurements are correct; always work to a level load water line and be sure the molds are both square and plumb to this line; shore and stay your keel and molds so that they cannot possibly move while the boat is being built; keep your tools sharp and keep your wood dry. There are two general types of small craft now in use, which may be classified as round-bottomed and hollow-bottomed boats. The first comprise the modern center-plate and bulb-fin boats (many of which are nearly or quite flat) whilst the second class consists of the deeper-bodied, sea-going cruisers and linear raters. The first type will be the easier for the beginner to tackle, owing to the simpler form of the keel and sections, and also because the weights of the various parts are much less in proportion to the size of the boat. For anyone who desires to build a small yacht this book is very useful, as it practically leaves nothing uncovered.

There is a merry pow-wow in New York at the present time because Gen. James A. Dumont, late supervising inspector-general of steam vessels, has been appointed inspector of hulls at that port. The contention is that this post is a far more important one in direct results than the office which Gen. Dumont has just surrendered; and that it should be occupied by a man who is thoroughly abreast of all that has taken place in marine engineering and vessel construction during the past twenty-five years. It is further contended that Gen. Dumont's extreme age makes it impossible for him to thoroughly supervise the great lists of steamships that enter the port of New York.

Mr. George Uhler, new supervising inspector-general of steam vessels, says that for a time at least he will be engaged in getting familiar with the service as it exists and in devising improvements. "Reorganization without a purpose does not mean anything in the way of improvement," said he, "and it is improvement in the service which is absolutely necessary for the protection of the lives of the great traveling public. As changes are formulated, after the proper study, they will be made, but in every change the good of the service will be the only thing sought."

DEATH OF REAR ADMIRAL BELKNAP.

Rear Admiral George Belknap, retired, died very suddenly at Key West this week. Although past the age limit of active service he had been performing duty on behalf of the general board of the navy at the time of his death and was making an examination for the board to determine the ability of Key West harbor to hold a large fleet. Admiral Belknap was born at Newport, N. H., and was appointed a midshipman at fifteen. In the fight between American naval vessels and the Chinese forts at the mouth of the Canton river in November, 1856, he commanded, as a lieutenant, one of the attacking launches. At the reinforcement of Fort Pickens in 1861 he commanded a vessel. Between 1862 and 1864 he commanded the ironclad New Ironsides in the various engagements with the Confederate forts at Charlestown. He served with distinction throughout the civil war. When Kalakau was elected king of Hawaii in February, 1874, Admiral Belknap commanded one of the American naval vessels in Honolulu harbor. In the ensuing riot he was especially commended for sending bluejackets ashore to restore order. His son, Reginald K. Belknap, is now a lieutenant in the navy on duty at Washington in the bureau of navigation.

SHIP YARD NOTES.

Last week Percy & Small, Bath, Me., launched a four-masted wooden schooner, the Florence M. Penley. She is 195 ft. long, 40 ft. wide and 20 ft. deep.

Howard's ship yard at Jeffersonville, Ind., will build a steamboat for Capt. Robert Cothell of Baton Rouge, Miss. She will be 120 ft. long, 27 ft. wide and 4 ft. deep and will be propelled by a stern paddle wheel.

April 16 has been selected as the date of the launching of the Minnesota, the first of the two steamships building at the yard of the Eastern Ship Building Co., New London, Conn., for the Great Northern Steamship Co.

E. L. Rowe & Son, Gloucester, Mass., have been given the contract for the entire duck outfit, sails, tarpaulins, sail covers for the six-masted steel schooner building at the yard of the Fore River Ship & Engine Co., Quincy, Mass.

Frank S. Bowker & Son, Phippsburg, Me., a few days ago launched the three-masted wooden schooner Doris. She is 142 ft. long, 35 ft. beam and 10 ft. deep. She was built for the lumber trade between Mexican, Cuban and Gulf ports.

Miss Catherine V. White, daughter of the governor of West Virginia, will christen the armored cruiser West Virginia, when that vessel is launched at the yard of the Newport News Ship Building & Dry Dock Co., Newport News, Va., on April 18.

MEETING WITH MARKED SUCCESS.

The Union Machine & Boiler Co., machinists, founders and boiler makers of 108 to 114 River street, Cleveland, have not only had more than their share, during the past winter, of marine repair work, to which they give special attention, but have been engaged on several important new jobs. This company, under the new officers that took charge some time ago—John B. Cowle, president, W. E. Perkins, secretary and treasurer, and Mat Thomas, general manager—is meeting with marked success, especially in the boiler and marine trade. A job about completed for L. P. & J. A. Smith, public works contractors, runs into several thousand dollars. The Smiths are building a suction dredge at the Tift farm, Buffalo, where they built the cribs for a large dock contract which they had with the Lackawanna Steel Co. Pumps for the dredge and a triple-expansion engine of 600 H. P. to run them are being made by the Great Lakes Engineering Works of Buffalo, and the suction pipe and agitator have just been finished by the Union Machine & Boiler Co. The agitator is a cutter used on hard material before it goes into the suction pipe. This dredge in ordinary work is expected to have a capacity of 10,000 yds. a day. It will be used on dredging contracts generally. Its first two years' work will be at Buffalo.

WATER LEVELS.

Gage records of the United States Lake Survey show the following mean stages of water above mean sea level, for March, 1903:

	WOOD.				STEEL.				TOTAL.	
	SAIL.		STEAM.		SAIL.		STEAM.			
	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.
Atlantic and gulf.	340	38,413	165	10,658	3	7,731	37	67,767	545	124,569
Porto Rico	9	105							9	105
Pacific	43	18,420	56	5,397			4	9,198	103	33,015
Hawaii	1	6	2	16					3	22
Great Lakes	8	2,858	29	1,853			17	60,646	54	65,367
Western rivers	1	11	95	4,390			4	2,708	100	7,109
Total	402	59,813	347	22,324	3	7,731	62	140,319	814	230,187

The present fall, Lake Huron to Lake Erie, 1.14 ft. less than a year ago.

Gov. Odell has signed the 1,000-ton barge canal bill. The proposition will now be submitted to the voters at the November election.

BELLEVILLE WATER-TUBE BOILERS

NOW IN USE (FEBRUARY, 1903)

On Board Sea-going Vessels, NOT INCLUDING New Installations Building or Erecting.

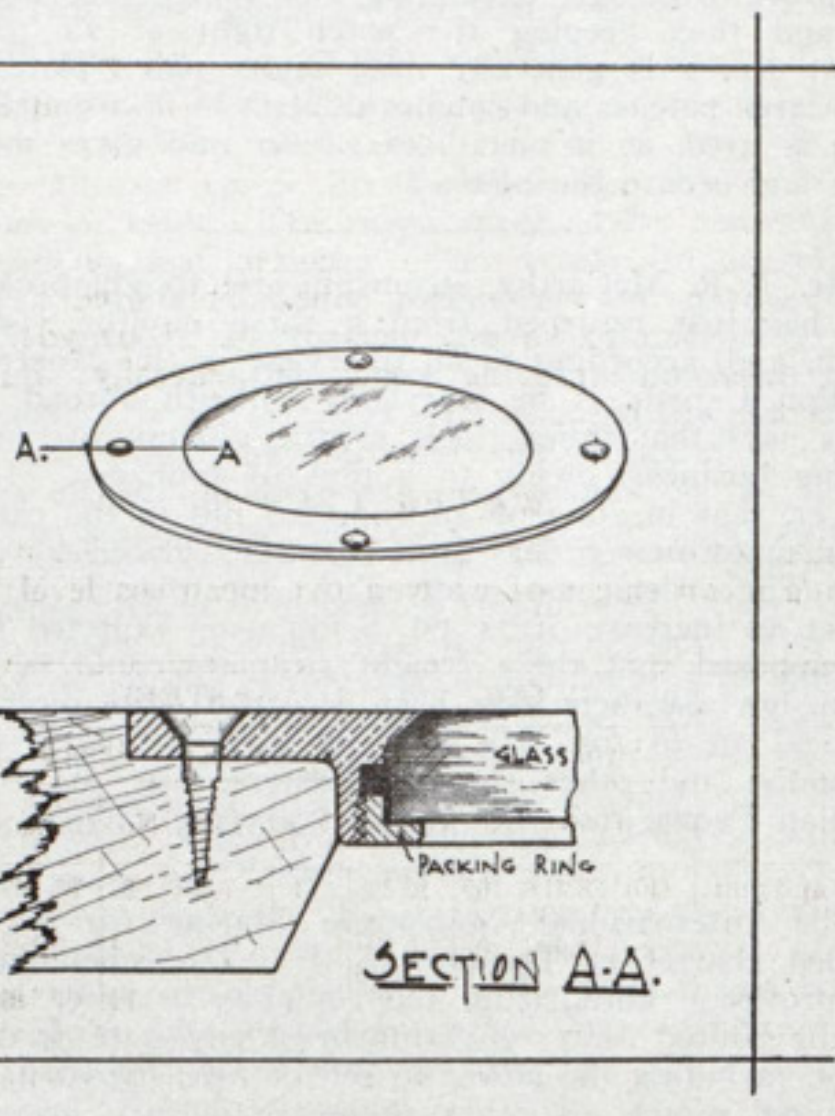
French Navy	-	-	-	-	-	-	-	276,460 H. P.
English Royal Navy	-	-	-	-	-	-	-	849,300 "
Russian Imperial Navy	-	-	-	-	-	-	-	193,900 "
Japanese Imperial Navy	-	-	-	-	-	-	-	122,700 "
Austrian Imperial Navy	-	-	-	-	-	-	-	32,900 "
Italian Royal Navy	-	-	-	-	-	-	-	13,500 "
Chilian Navy	-	-	-	-	-	-	-	26,500 "
Argentine Navy	-	-	-	-	-	-	-	13,000 "
The "Messageries Maritimes" Company	-	-	-	-	-	-	-	87,600 "
Chemins de fer de l'Ouest: (The French Western Railway Co.)	-	-	-	-	-	-	-	Steamships
plying between Dieppe and Newhaven	-	-	-	-	-	-	-	18,500 "
Total Horse Power of Boilers <u>in Use</u>	-	-	-	-	-	-	-	1,634,360

WORKS: Ateliers et Chantiers de l'Ermitage, at Saint-Denis (Seine), France.

TELEGRAPHIC ADDRESS: Belleville, Saint-Denis-Sur-Seine.

PERFECTLY TIGHT DECK LIGHT.

The Delaware Marine Supply Mfg Co. of Wilmington, Del., has recently put on the market an improved deck light, the novel features of which make it much superior to deck lights used at the present time. Referring to the section, illustrated on this page, the joint between the glass and the frame is made watertight by a packing ring, which, when screwed into place, compress the packing. The upper edge of the glass is beveled to fit the frame, so that the top of the glass is flush with the top of the frame. The glass is ground on top to make it non-slippery. This company, new as it is, has already gained quite a



An Improved Deck Light.

reputation for its specialties (airports, deck lights and coaling scuttles), and improvements in this line of goods are being continually added to its lists.

The importance to the yachtsman or vessel owner, as well as those who live below decks, of a perfectly tight deck light is invaluable, and there is no reason to doubt that the Delaware company has overcome the possibility of a leak in connection with their device under any conditions of weather. This company also manufactures a fine line of ship fittings and marine hardware, all up to the government requirements and standard.

TRADE NOTES.

Stanley B. Smith & Co., Toledo, have put out a calendar which is of an especially striking character. It is a reproduction in the three-color process of Albert Lynch's painting "Therese." The mechanical work is most excellently done by the Osborne Co. and the calendar must take its place among the art productions of the year.

Mr. J. B. d'Homergue, manager of the Keystone hair insulator department of the H. W. Johns-Manville Co. of New York, sailed on the 30th ult. for England, where he will make an exhaustive and comprehensive investigation of the trade for asbestos and sound-deadening materials in that country. Upon his return in May, he will be permanently located in New York.

On account of business constantly increasing, the Crandall Packing Co. has found it necessary to have larger quarters in which to conduct the volume of trade emanating from their New York office. They have leased commodious apartments at 123 Liberty street, where their offices and sales room will be located. Mr. S. M. Hildreth, local manager, will be very glad to welcome customers at the new location and explain the various packings.

The American Steam Gauge & Valve Mfg. Co. and the Mowry & Phillips Co. have become merged under the corporate name of the American Steam Gauge & Valve Mfg. Co., and the business heretofore conducted under the two names will hereafter be conducted under the name of the American Steam Gauge & Valve Mfg. Co., a corporation organized under the laws of New Jersey. Officers of the new company are as follows: John

McCandlish, president; M. Briggs Phillips, vice-president; R. B. Phillips, secretary; J. L. Weeks, treasurer and general manager. Other officials are the same as have been serving under the separate companies.

Charles M. Heald of Detroit, formerly president of the Pere Marquette, has assumed at Buffalo the duties of president and general manager of the Mutual Transit Co. and Mutual elevator property recently purchased from the Northern Steamship Co. by four trunk line railroads.

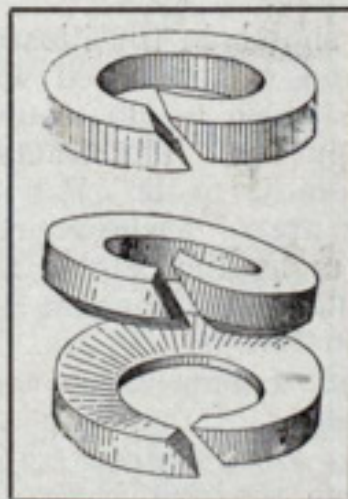
The treasury department has amended rule 16 of the regulations of Jan. 22, 1901, governing the navigation of St. Mary's river so as to read as follows: "When a steamer and tug towing scow from dredge at work deepening channel in Little Rapid cut, shall be moving in same direction steamer may pass westward of tug, providing former gives customary signal for steamer when passing another steamer moving in same direction and this signal is answered by tug. The tug will, however, keep well over to eastern side of channel as steamer passes. But overtaking steamer shall not pass tug towing scow if steamer be approaching in opposite direction so as to make three vessels abreast when thus passing."

A dispatch from Erie says that the wage difficulty between the local fishermen's union and the fish tug owners has finally been adjusted and the strike is off. The fishermen will again work on shares as they did last season, only under more advantageous conditions. The crew is to take half the catch each day and the boat owners the other half, while the boat owners pay the entire cost of coal, oil and other supplies. Last year the division of the catch was on the same basis but the fishermen stood one-half the expense of operating. This proposition is said to be the best offered to any fishermen on the lakes. An agreement has already been made with the captains and engineers whereby they receive \$105 and \$100 respectively.

The New York Ship Building Co., Camden, N. J., has just secured its second contract for a fireboat for the city of New York.

The torpedo boat Tingey, built by the Columbia Iron Works, Baltimore, Md., is preparing for the dock trial of her engines and machinery.

"VULCABESTON"
CONCAVE and CONVEX
PACKING RINGS



Used by representative power stations and steam plants for the Piston Rod, Reciprocating and Corliss Valve Stem and Throttle Stem Packing on stationary engines. Will not score the rod. Readily conform to any unevenness in the rod and greatly reduce friction.

Made in pairs Concave and Convex split diagonally opened laterally and sprung over the rod. This formation tends to press the Convex Rings closely to the rod and the Concave Rings to the box, preventing leakage of steam at either side. Practically indestructible. Will pack satisfactorily against high pressure or superheated steam, and work perfectly in vacuum.

SEND FOR CATALOGUE "V"

SHEET PACKING

30 to 50 per cent. cheaper than rubber or composition packing. More durable and efficient.

ROPE PACKING

Braided from pure Asbestos yarn vulcanized with Rubber.

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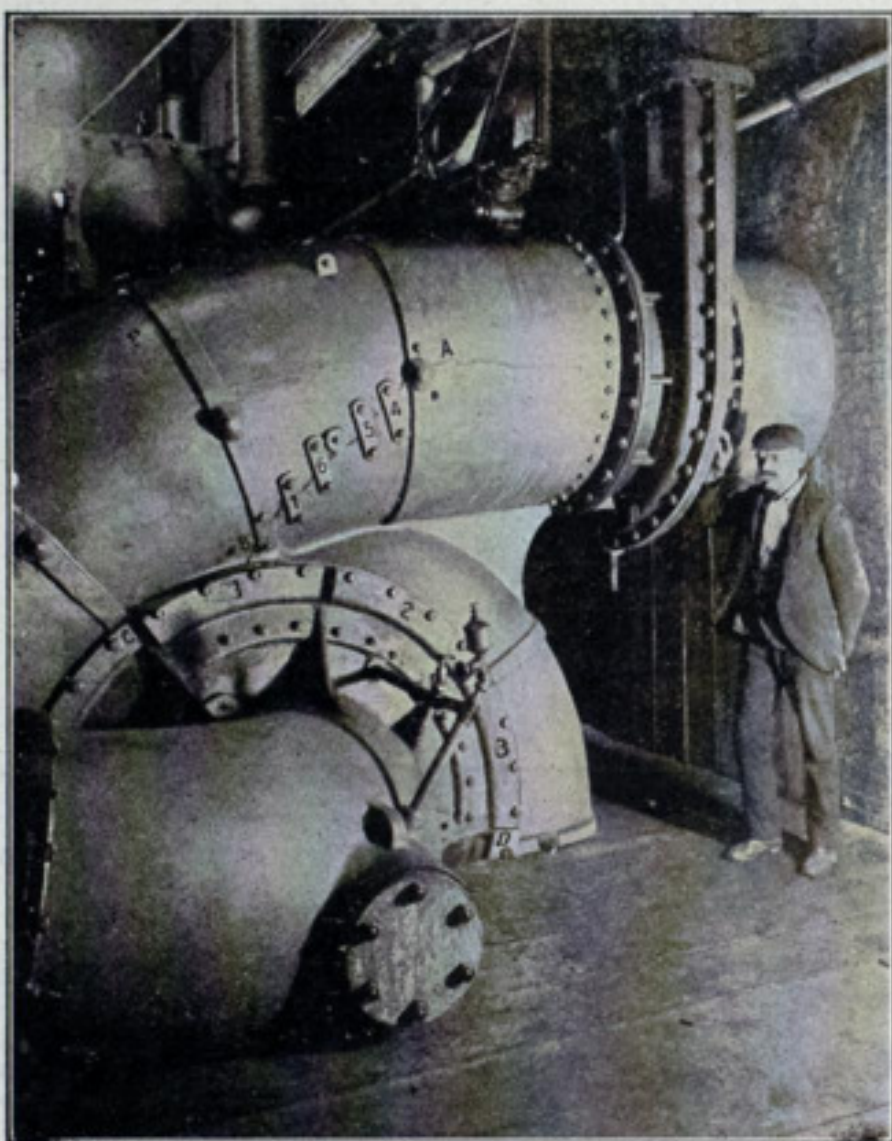
ALBERT C. JAHL, General Manager,
100 William St., New York, U. S. A.

FOR SHIPS AND FORTIFICATIONS.

REPAIRS TO BREAKDOWNS.

In support of the claim that many breakdowns incidental to machinery subjected to steam and hydraulic pressure can be successfully repaired by use of the material known to engineers as Smooth-On iron cement, the manufacturers are presenting some very strong endorsements, the best of them coming from naval officers, who are not given to extending praise where it is not warranted. An illustration appearing herewith shows repairs to a large centrifugal pump in a dry dock pumping station at the New York navy yard. Following is an extract from a report made by an engineer in the department of construction and repair:

"For over four years I have used Smooth-On iron cement No. 1 and have found it to be as good as a new casting when used in repairing breaks in castings. I have found it to make steam joints tight when everything else failed. I have used it in porous castings that had to stand 180 lbs. steam pressure and on steam pipes that leaked and have never had any trouble with anything I have repaired with it. About four years ago one of our 45-in. centrifugal pumps split almost in two, due to a sudden strain. The crack was over 20 ft. long and in some places opened up $\frac{3}{4}$ in. To replace this pump would take months and we needed it badly. This fracture was repaired with Smooth-On iron cement No. 1. The pump was running on the third day after the break and ran successfully for thirteen months when



it was replaced by a new pump. The cut shown in the illustration broke about a year and a half ago and was repaired with Smooth-On as was the first pump. It has given us no trouble. The illustration shows the pump as now in use. The fracture extends from A through B to C and from C to D. Patches 1, 2 and 3 are brass. Straps 4, 5, 6 and 7 are of wrought iron. Smooth-On was used in the fractures and under the patches and straps. When this pump was placed the flanges connecting the gate valve with the pump did not come in line by $2\frac{1}{2}$ in. To make this joint the pump flange was cut off, a plate of wrought iron was flanged and shaped to fit the interior of the main and bolted to it, so the flange fitted the flange of the gate valve. Both the flange joint and the joint between the main pipe and the inserted flanged sleeve were made with Smooth-On. The suction pipe to this pump broke in two, underground, due to settling of the ground, over three years ago. This was also repaired with the cement and has not given trouble since. I have

had at least a dozen of these breaks and after repairing them with this cement have never had trouble with them."

One of the engineers of the bureau of steam engineering, navy department, says in a letter to the Smooth-On company: "We have used Smooth-On iron cement on all permanent joints on marine boilers, such as under the nuts of screw stay bolts and in main stay braces. In the fillet of reverse flange joints on corrugated furnace flues of steam boilers, and in places difficult to calk, this cement always insures a tight joint. Under boiler patches it has proved itself a very good material. It is not necessary to remake joints every little while, as the cement seems to improve with age, expanding and contracting with heat and cold and thus keeping the patch tight at all temperatures. Cement No. 1 is generally used under patch plates. In cases where large patches and patches difficult to fit are applied, cement No. 2 is used, as it metallizes slower and gives more time to adjust and secure the plates."

Mr. T. R. McCarthy, steamship and freight broker at Montreal, has just returned from a three months visit to Great Britain, and, according to an interview in the Montreal Gazette, says that Canada is in everybody's mouth abroad. Mr. McCarthy says that things look a little gloomy just now for the shipping business, owing to a plus of tonnage. He explains, however, that in spite of an expected lull in the carrying trade a good many new orders have just been placed for freight vessels. The orders just referred to were placed, Mr. McCarthy says, at an increase of 7s. 6d. a ton over expected figures. It was supposed that these freight steamers could be built at £6 per ton but contracts have been accorded quite recently at from £6 7s. 6d. to £6 10s. He also described the lively interest felt in London and other shipping centers over the entry of the Canadian Pacific into the Atlantic carrying trade.

The International Mercantile Marine Co. has filed an amended charter at Trenton, N. J. The amendment consists of a provision authorizing the company to enter into contract with the United States government or any state or dependencies thereof, including the power to sell or hire any of its steamships or sailing vessels of other property to such governments or states for any purpose whatsoever, whether naval, military or otherwise.

The term of the Bath Iron Works school of ship building, which is now nearing its close, has proved a remarkable success. It will probably prove still more so another year, now that its value is understood. The class this year was largely made of young men from the Bath Iron Works but next year it is hoped to induce others to take advantage of the course.

To Sell Rubber Goods.

Salesman wanted to carry a side line of specialties in rubber goods for the lake trade—valves, sheet packing, hose, etc. Would work well with a line of oils, waste or goods of that nature. The Goodyear Tire & Rubber Co., Akron, Ohio.

Apr. 9.

Tug, Scow, Etc.

For Sale.—Tug, scow and sand pump. All in good order. Price reasonable. Address Butler Bros., St. Paul, Minn.

Apr. 30.

"Seaboard Steel Castings"

A Guarantee of Quality.

Open Hearth Steel Castings of the Highest Grade for Locomotive, General Machinery and Shipbuilding Work.

Subject to U. S. Government, Lloyds, Railroad and Other Highest Requirements.

Seaboard Steel Casting Co.,
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If you want to KNOW **WHY**

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CABLE SHIPS FOR REPAIR WORK.

The London Electrician contains an elaborate description of two cable ships that have just been built for the Australasia & China Telegraph Co., to be used in repair work. The ships represent the best modern practice and differ materially in detail from others, owing to the fact that they are to be used for cable repairing rather than cable laying, and that they are also equipped with wireless telegraph apparatus, a novelty in cable ships. The two ships, which are practically identical, are each 377 ft. over all and 340 ft. on the waterline with 44 ft. beam. They are fitted with twin screws, driven by triple-expansion engines. There are four cable tanks, capable of carrying a total 377 ft. over all and 340 ft. on the waterline with 44 ft. beam. of 1,800 tons of cable. The mean speed under test was about 15 knots with normal draught. The vessels are provided forward with a double combined picking-up and paying-out machine. Two parts of this machine are capable of being worked independently of each other, there being two separate engines, but the machine is so arranged that the engines for the port side drum may drive the starboard side drum, or *vice versa*. The hauling-off and holding-back gear stands on the spardeck, and is driven from the geared frame by means of a chain drive through a friction strap and three-wheeled arrangement in such a manner that it is driven in one direction only, that for picking up, whereas it runs free for paying out. The special machine placed aft for paying out longer lengths of cable over the stern is fitted with a hydraulic brake. The cable drum is internally geared and made to drive four cranks, which, in turn, give reciprocating motion to four plunger rods working in open cylinders. Each rod carries two plungers, which are arranged to work one above and one below a transverse diaphragm in these cylinders. The diaphragm has ports which can be opened or closed in order to afford the necessary resistance for braking. The vessels are fitted with steam-driven sounding machines. They are completely wired for lights and fans. They are equipped with wireless telegraph apparatus of the newest Lodge-Muirhead system. A few wires, forming a strap about 2 ft. wide, are elevated 102 ft. above the deck and terminate at their lower end in a flexible cord and plunger, which can be connected either to the sending or receiving apparatus. The latter makes use of an ingenious coherer consisting of a small metal disk which is continuously rotating in a tiny mercury bath, the surface of which is covered with oil. Under the influence of Hertzian waves, the wheel and mercury are in electrical contact, but normally the oil ensures a belt of resistance between the two. No decoherer is needed. The signals are recorded by a syphon recorder. The testing rooms on the vessels will be completely fitted with all necessary apparatus, and the vessels will be stationed, one at Adelaide and one at Singapore.

INQUIRY INTO AMERICAN COMPETITION.

A conference of the British Iron Trade Association in reference to American competition was held recently in London. Mr. E. Parkes, the chairman, said in his address that the outlook for trade, especially the iron trade, was not encouraging. The condition of the iron and steel trade had been one of long depression with an occasional boom. This state of trade had been ascribed to their own lack of education. Some said the fault lay with the British workmen but he could say that the best American workmen were no better than the best of English-mechanics. The only question was whether the latter were not held down by undue restrictions. Mr. Parkes said he thought the real cause of the English lack of development was the difficulty of obtaining spare capital. They were wedded to free trade and had good times only when other countries were fully occupied at home. It was a very one-sided free trade. They would have to face the fact that trade conditions had changed since forty or fifty years ago. Free trade might have been right then, but it was not at all adapted to the present conditions.

Mr. Axel Sahlin, who recently returned from America, said he had noticed many changes in the labor situation in America. The workman, who was often a capitalist in a small way, was always aspiring to improve his social position. He was, therefore, easier to deal with than those who simply allowed themselves to be led by men who made such leadership their business. He considered the preponderance of the United States Steel Corporation very fortunate for the British and European iron trade. The Steel Corporation would undoubtedly use every resource to maintain prices at something like the present level, at which most British works could undersell the American product, both at home and in the colonial markets. The more he learned of the relative positions and possibilities of America and Great Britain the more he was convinced that the better part of the iron and steel industry of Great Britain occupied an unassailable position. Far from feeling concerned over the future of the industry in the British empire, he saw possibilities of development which would one day astonish the world. Until that day arrived they must expect the most serious competition and the invasion of the entire British steel market.

Enoch James said that one obvious lesson to be learned in America was the value of listening to a man who knows what he is talking about.

As a part of its process of concentration, as exemplified last year by the merging of the National Steel, Steel Hoop and Carnegie companies the Steel Corporation has now merged its coke concerns. The capital of the H. C. Frick Coke Co. has been increased from \$10,000,000 to \$20,000,000 to provide for the absorption. The corporations merged are the H. C. Frick Coke Co., the United Coal & Coke Co., the McClure Coke Co., Continental Coke Co., American Coke Co., and southwest Connellsville Coke Co.

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U. S. Engineer Office, Grand Rapids, Mich., April 6, 1903. Sealed proposals for Repair of Piers at St. Joseph and Black Lake, Mich., will be received here until 3 P. M., May 6, 1903, and then publicly opened. Information furnished on application. J. G. WARREN, Major Engrs. April 30

U. S. Engineer Office, Grand Rapids, Mich., Mar. 12, 1903. Sealed proposals for extension of west breakwater at Petoskey, Mich., will be received here until 3 p. m., April 11, 1903, and then publicly opened. Information furnished on application. CHARLES KELLER, Capt. Engrs. April 9.

U. S. Engineer Office, Duluth, Minn., Mar. 12, 1903. Sealed proposals for furnishing 6,000 barrels Portland cement for concrete superstructure to breakwater at Marquette, Mich., will be received here until noon Apr. 11, 1903, and then publicly opened. Information on application. D. D. GAILLARD, Capt., Engrs. April 9.

U. S. Engineer Office, Duluth, Minn., Mar. 25, 1903. Sealed proposals for furnishing 7,000 cu. yds. broken stone and 4,000 cu. yds. sand for Concrete Superstructure to breakwater, Marquette, Mich., will be received here until noon April 24, 1903, and then publicly opened. Information on application D. D. GAILLARD, Capt., Engrs. April 16.

Small Steamer for Sale.

For Sale Cheap—Small steamer suitable for fishing or pleasure. For particulars, address F. Minier, Saugatuck, Mich. Apr. 9.

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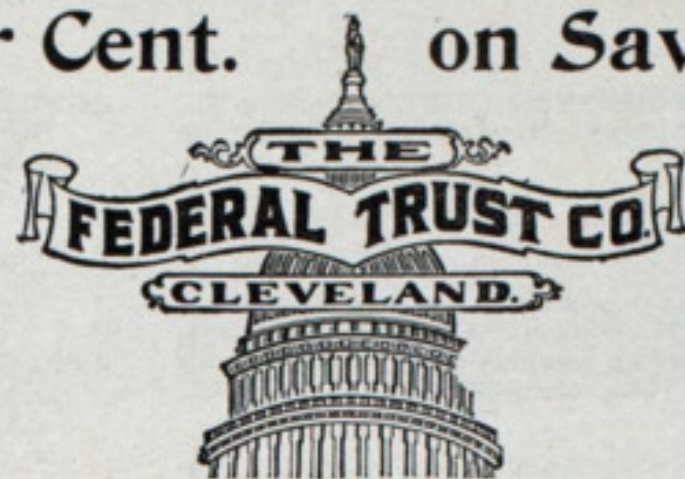
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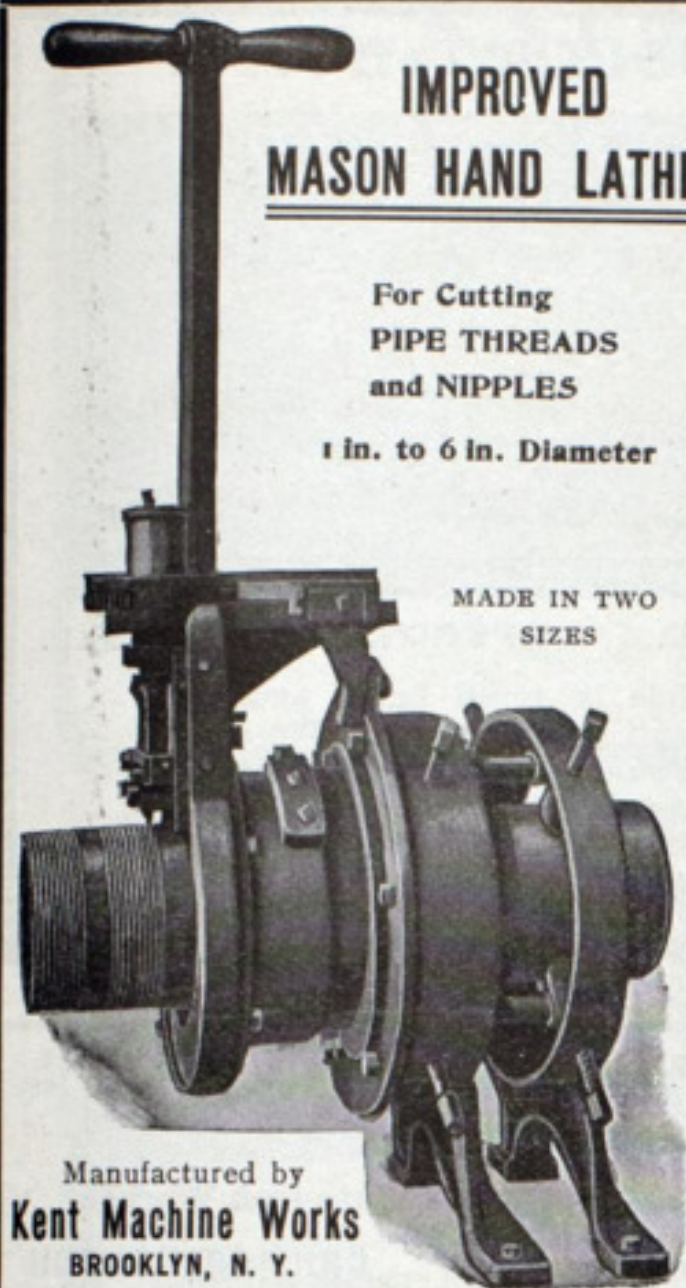
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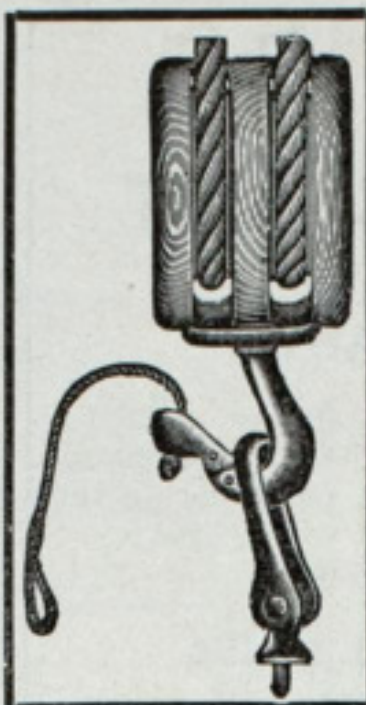
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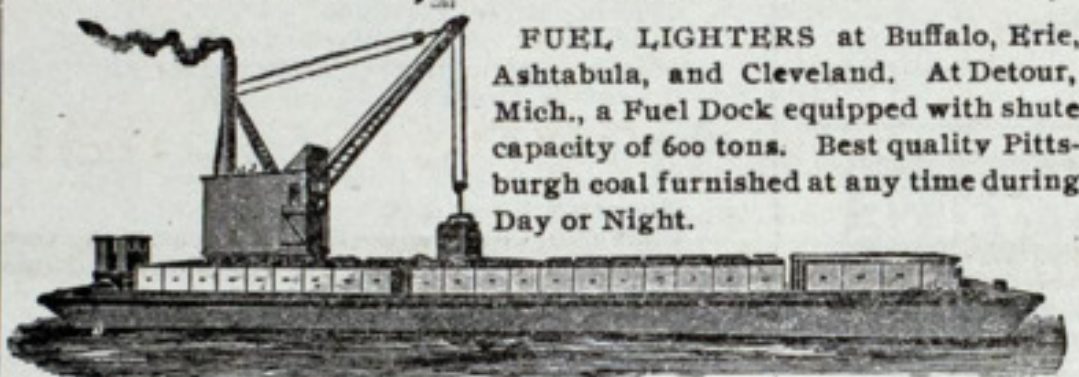
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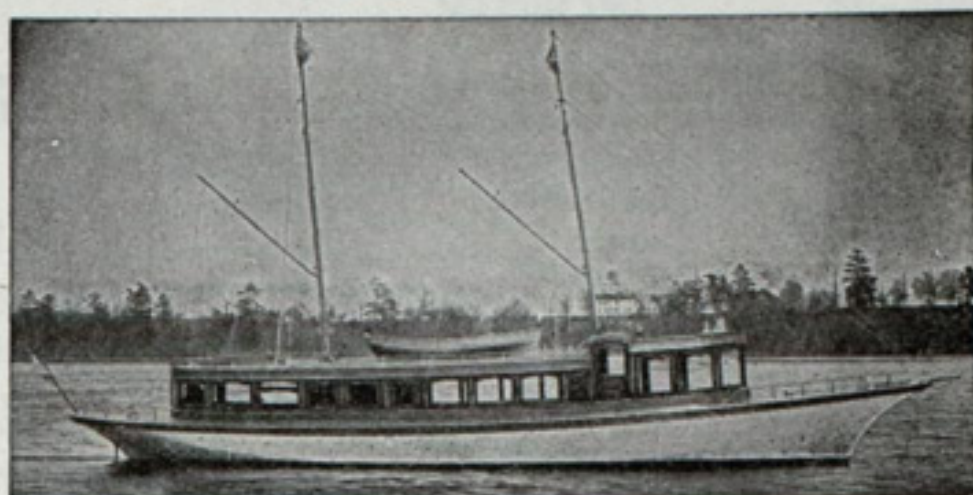
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Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.....Boston.

BOAT BUILDERS.

Drein, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, David.....New York.
Lane & DeGroot.....Long Island City, N. Y.
Marine Construction & D. D. Co.,
.....Mariner's Harbor, S. I., N. Y.
Marine Iron Works.....Chicago.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Warrington Iron Works.....Chicago.
Willard, Chas. P. & Co.....Chicago.

BOILER MANUFACTURERS.

Almy Water Tube Boiler Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Babcock & Wilcox Co.....New York.
Bath Iron Works, Ltd.....Bath, Me.
Boyer's Sons, L.....New York.
Chicago Ship Building Co.....Chicago.
Clyde Machine Works.....Chicago.
Columbia Iron Works.....Port Huron.
Cramp, Wm. & Sons.....Philadelphia.
Dearing Water Tube Boiler Co.....Detroit.
Delauney Belleville & Co.....St. Denis, France.
Detroit Shipbuilding Co.....Detroit.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Forest City Boiler Co.....Cleveland.
Jenks Ship Building Co.....Port Huron, Mich.
Kingsford Foundry & Machine Works.....Oswego, N. Y.
Lake Erie Boiler Works.....Cleveland.
MacKinnon Mfg. Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Milwaukee Dry Dock Co.....Milwaukee.
Moran Bros. Co.....Seattle, Wash.
Mosher, Chas. D.....New York.
Neafe & Levy Ship & Engine Building Co.....Phila.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Roberts Safety Water Tube Boiler Co.....New York.
Stirling, The Co.....Chicago.
Superior Ship Building Co.....Superior, Wis.
Taylor Water Tube Boiler Co.....Detroit.
Trigg, Wm. R. Co.....Richmond, Va.
Union Machine & Boiler Co.....Cleveland.
Warrington Iron Works.....Chicago.
Willard, Chas. P. & Co.....Chicago.

BOILER COMPOUNDS.

Dearborn Drug & Chemical Works.....Chicago.

BOILER COVERING.

Johns-Manville Co., H. W.....New York.

BOILER RIVETS.

Bourne-Fuller Co.....Cleveland.

BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co.Cuyahoga Falls, O.

BRASS AND BRONZE CASTINGS.

Cramp, Wm. & Sons.....Philadelphia.
Fore River Ship & Engine Co.....Quincy, Mass.
Macbeth Iron Co.....Cleveland.
Phosphor Bronze Smelting Co.....Philadelphia.

BRASS—SHEET, ROD, ETC.

Waterbury Brass Co.....New York.

BRASS WORK, MARINE.

Farnan Brass Works.....Cleveland.

BRIDGES, BUILDERS OF

Scherzer Rolling Lift Bridge Co.Chicago.

BUCKETS, ORE AND COAL.

Bartlett & Snow Co., C. O.Cleveland.
Brown Hoisting & Conveying Machine Co.Cleveland.
Lake Erie Boiler Works.....Cleveland.
Webster, Camp & Lane Co.....Akron, O.

CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co.....Cleveland.

CAPSTANS.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.Bath, Me.

CARPETS, RUGS, FURNITURE, ETC.

Sterling & Welch Co.....Cleveland.
Williams & Rodgers Co., TheCleveland.

CAST IRON PIPE.

Wood & Co., R. D.Philadelphia.

CEMENT, IRON, FOR REPAIRING LEAKS.

Smooth-On Mfg. Co.Jersey City, N. J.

CHAINS.

Standard Chain Co.Pittsburg.

CHAIN HOISTS.

Boston & Lockport Block Co.Boston, Mass.
Dake Engine Co.Grand Haven, Mich.

CHARTS.

Marine Review Pub. Co.....Cleveland.
Potter, J. D.....London.

CIRCULATOR, EQUILIBRIUM,

With Steam Heating Attachment.

Bloomsburg & Co., H.Baltimore, Md.

CLOCKS (Marine), CHRONOMETERS, BELLS.

Ashton Valve Co.Boston.
Bliss, John & Co.New York.
Chelsea Clock Co.Boston.
Ritchie, E. S. & Sons.....Brookline, Mass.

COAL PRODUCERS AND SHIPPERS.

Castner, Curran & BullittBoston.
Graham Coal & Coke Co., Ltd.....Detroit.
Hanna, M. A. & Co.Cleveland.
Pickands, Mather & Co.Cleveland.
Pittsburg Coal Co.Cleveland.
Rochester & Pittsburg Coal & Iron Co.Buffalo.

COAL AND ORE HANDLING MACHINERY.

Bartlett & Snow Co., C. O.Cleveland.
Brown Hoisting Machinery Co., (Inc.)...Cleveland.
Lidgerwood Mfg. Co.....New York.
Webster, Camp & Lane Co.....Akron, O.

COMPASSES.

Bliss, John & Co.New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

COMPASS ADJUSTER.

Fields, Capt. J. M.....Cleveland

CONDENSER TUBE PACKING.

Allen, JosephCollingswood, N. J.

CONTRACTORS FOR PUBLIC WORKS.

Smith Co., L. P. & J. A.Cleveland.

COPPER, TIN AND SHEET IRON WORK.

Lake Erie Boiler Works.....Cleveland.
McCutcheon, C. H.....Buffalo.
Topky BrothersAshtabula, O.

COPPER—SHEET, TUBES AND ROD.

Waterbury Brass Co.....New York.

CORDAGE.

Baker & Co., H. H.....Buffalo.
DeGrauw, Aymar & Co.....New York.
Upson-Walton Co.....Cleveland.

CORK JACKETS AND RINGS.

Armstrong Cork Co.Pittsburg, Pa.
Kahnweiler's Sons, D.New York.
Lane & DeGrootLong Island City, N. Y.

CHAIN CONVEYORS, HOISTS.

Bartlett & Snow Co., C. O.Cleveland.
Brown Hoisting Machinery Co., (Inc.)...Cleveland.
Chicago Pneumatic Tool Co.Chicago.
General Electric Co.Schenectady, N. Y.
Lidgerwood Mfg. Co.....New York.
Railway Appliances Co.Chicago.
Westinghouse Electric & Mfg. Co.Pittsburg.

DEAD-LIGHTS, AIR-PORTS, ETC.

"Long-Arm" System Co.Cleveland.

DIPPER TOOTH FOR DREDGES AND STEAM EXCAVATORS.

Pryor Patent Excavator Tooth Co..Houghton, Mich.

DIVING APPARATUS.

Morse, A. J. & Son.....Boston.
Schrader's Son, A.New York.

DOORS, WATER TIGHT, ETC.

Long Arm System Co.....Cleveland.

DRAWING MATERIALS.

Schwencke, Kirk & Co.....New York.

DREDGE ENGINES FOR HANDLING DUMP SCOW LINES.

Superior Iron WorksWest Superior, Wis.

DREDGING CONTRACTORS.

Smith Co., L. P. & J. A.Cleveland.

DRILL PRESSES—DRILLS OF ALL KINDS.

Cleveland Punch & Shear Works Co.Cleveland.
Railway Appliances Co.Chicago.

DRYING APPARATUS.

Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.Boston.

DRY DOCKS.

American Ship Building Co.Cleveland.
Atlantic WorksEast Boston, Mass.
Baltimore Ship Building Dry Dock Co...Baltimore.
Bath Iron Works, Ltd.Bath, Me.
Buffalo Dry Dock Co.Buffalo.
Chicago Ship Building Co.Chicago.
Craig Ship Building Co.Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Ship Building Co.Detroit.
Lockwood Mfg. Co.East Boston, Mass.
Manitowoc Dry Dock Co.....Manitowoc, Wis.
Marine Construction & Dry Dock Co.New York.
Maryland Steel Co.Sparrow's Point, Md.
Milwaukee Dry Dock Co.Milwaukee.
Moran Bros. Co.Seattle, Wash.
Newport News Ship Building Co. Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.Wilmington, Del.
Shipowners Dry Dock Co.Chicago.
Superior Ship Building Co.....Superior, Wis.

ELECTRIC HOISTS AND CRANES.

Elwell-Parker Electric Co.Cleveland.
General Electric Co.Schenectady, N. Y.
Lidgerwood Mfg. Co.....New York.
Westinghouse Electric & Mfg. Co.Pittsburg, Pa.

ELECTRIC FIXTURES AND APPLIANCES.

General Electric Co.Schenectady, N. Y.
Seldler-Miner Electric Co.Detroit.
United Marine Mfg. & Supply Co.....New York.
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

ELECTRIC LIGHT AND POWER PLANTS.

Buffalo Forge Co.Buffalo.
Electro-Dynamic Co.Philadelphia.
Elwell-Parker Electric Co.Cleveland.
General Electric Co.Schenectady, N. Y.
Seldler-Miner Electric Co.Detroit.
Sturtevant, B. F. Co.Boston.
United Marine Mfg. & Supply Co.....New York.
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

ELECTRIC STEERING GEAR, SPEED AND

RUDDER INDICATORS, ETC.

Electro-Dynamic Co.Philadelphia.

ENGINE BUILDERS, MARINE.

American Ship Building Co.....Cleveland.
Atlantic WorksEast Boston, Mass.
Bath Iron Works, Ltd.Bath, Me.
Buffalo Forge Co.Buffalo.
Chicago Ship Building Co.....Chicago.
Chase Machine Co.Cleveland.
Columbia Iron WorksPort Huron.
Craig Ship Building Co.Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Dake Engine Co.Grand Haven, Mich.
Detroit Ship Building Co.Detroit.
Fletcher, W. & A. Co.Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit, Mich.
Hall Bros.Philadelphia.
Jenks Ship Building Co.Port Huron, Mich.
Lockwood Mfg. Co.East Boston, Mass.
MacKinnon Mfg. Co.Bay City, Mich.
Maryland Steel Co.Sparrow's Point, Md.
Milwaukee Dry Dock Co.Milwaukee.
Moran Bros. Co.Seattle, Wash.
Mosher, Chas. D.New York.
Neafe & Levy Ship & Engine Bldg. Co. Philadelphia.
Newport News Ship Building Co. Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.Wilmington, Del.
Risdon Iron WorksSan Francisco.
Roach's Ship YardChester, Pa.
Thropp, J. E. & Sons Co.Trenton, N. J.
Sheriffs Mfg. Co.Milwaukee.
Superior Ship Building Co.....Superior, Wis.
Trigg, Wm. R. Co.....Richmond, Va.
Trout, H. G.Buffalo.
Warrington Iron Works.....Chicago.
Willard, Chas. P. & Co.Chicago.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.
Cory, Chas. & SonNew York.
Electro-Dynamic Co.Philadelphia.
MacLean Hydraulic Signal Co.Chicago.
Seldler-Miner Electric Co.Detroit.

ENGINEERING SPECIALTIES AND SUPPLIES.
Crane Co.Chicago.
Farnan Brass WorksCleveland.
Kieley & MuellerNew York.
McCutecheon, C. H.Buffalo.
New York Belting & Packing Co.New York.
Relly Repair & Supply Co., James.New York.

**ENGINEERS, MARINE, MECHANICAL,
CONSULTING.**

Electro-Dynamic Co.Philadelphia.
Garrett-Cromwell Engineering Co.Cleveland.
Gaskin, EdwardBuffalo.
Hunt, Robt. W. & Co.Chicago.
Kidd, JosephDuluth, Minn.
Logan, RobertCleveland.
Mosher, Chas. D.New York.
Newman, R. L.New York.
Pittsburg Testing Laboratory, Ltd.Pittsburg.
Powell, Ambrose V.Chicago.
Roelker, H. B.New York.
Sadler, Perkins & Field.New York.
See, HoraceNew York.
Wood, W. J.Chicago.

EVAPORATING AND DISTILLING APPARATUS.
Relly Repair & Supply Co., James.New York.

FANS FOR VENTILATION, EXHAUST, ETC.
Buffalo Forge Co.Buffalo.
Sturtevant, B. F. Co.Boston.

FEED WATER PURIFIERS AND HEATERS.
Learnboth, RobertBuffalo.
Relly Repair & Supply Co., James.New York.
Ross Valve Co.Troy, N. Y.

FIXTURES FOR LAMPS, OIL AND ELECTRIC.
General Electric Co.Schenectady, N. Y.
Seldler-Miner Electric Co.Detroit.
Westinghouse Electric & Mfg. Co.Pittsburg, Pa.

FORGES.

Buffalo Forge Co.Buffalo.
Sturtevant, B. F. Co.Boston.

**FORGINGS FOR CRANK, PROPELLER OR
THRUST SHAFTS, ETC.**

Cleveland City Forge & Iron Co.Cleveland.
Fore River Ship & Engine Co.Quincy, Mass.
Macbeth Iron Co.Cleveland.

FLUE WELDING.

Fir's, S. SonsCleveland.

FURNACES FOR BOILERS.

Continental Iron Works.New York.

FUELING COMPANIES AND COAL DEALERS.

Castner, Curran & Bullitt (Pocahontas)Phila.
Graham Coal & Coke Co., Ltd.Detroit.
Hanna, M. A. & Co.Cleveland.
Pickands, Mather & Co.Cleveland.
Pittsburg Coal Co.Cleveland.
Rochester & Pittsburg Coal & Iron Co.Buffalo.
Smith, Stanley B. & Co.Detroit.
Youghiogheny & Lehigh Valley Coal Co.Chicago.

GASKETS, RUBBER.

New York Belting & Packing Co.New York.

GAS BUOYS.

Safety Car Heating & Lighting Co.New York.

GAS AND GASOLINE ENGINES.

Chase Machine Co.Cleveland.

GAGES, STEAM AND VACUUM.

American Steam Gauge Co.Boston.
Ashton Valve Co.Boston.

GRAPHITE.

Dixon Crucible Co., JosephJersey City, N. J.

HAMMERS, STEAM.

Chase Machine Co.Cleveland.
Railway Appliances Co.Chicago.

HARDWARE, SHIP.

Topky BrothersAshtabula, O.

HATCH GEARS.

"Long-Arm" System Co.Cleveland.

HEATING APPARATUS.

Buffalo Forge Co.Buffalo.
Sturtevant, B. F. Co.Boston.

HOISTS FOR CARGO, ETC.

American Ship Building Co.Cleveland.
Brown Hoisting Machinery Co., Inc.Cleveland.
Chase Machine Co.Cleveland.
Elwell-Parker Electric Co.Cleveland.
General Electric Co.New York.
Hyde Windlass Co.Bath, Me.
Lidgerwood Mfg. Co.New York.
Marine Iron Co.Bay City.
Westinghouse Electric & Mfg. Co.Pittsburg, Pa.

HOLLOW STAYBOLT IRON.

Falls Hollow Staybolt Co.Cuyahoga Falls, O.

HOSE FITTINGS.

Farnan Brass Works.Cleveland.

HOSE, RUBBER.

New York Belting & Packing Co.New York.

HYDRAULIC MACHINERY.

Watson-Stillman Co., The.New York.
Wood & Co., R. D.Philadelphia.

ICE MACHINERY.

American Linde Refrigerating Co.New York.
Roelker, H. B.New York.

INDICATORS FOR STEAM ENGINES.

American Steam Gauge Co.Boston.
Ashton Valve Co.Boston.

INJECTORS.

American Injector Co.Detroit.
Crane Co.Chicago.
Jenkins Bros.New York.
Lunkenheimer Co.Cincinnati.
Penberthy Injector Co.Detroit, Mich.

INSURANCE, MARINE.

Brown & Co.Buffalo.
Brown, W. W.Cleveland.
Dunham, R. J.Chicago.
Elphicke, C. W. & Co.Chicago.
Fleming & Co., P. H.Chicago.
Hawgood & Co., W. A.Cleveland.
Helm & Co., D. T.Duluth.
Hutchinson & Co.Cleveland.
Insurance Co. of North America.Philadelphia.
McCarthy, T. R.Montreal.
McCurdy, Geo. L.Chicago.
Mitchell & Co.Cleveland.
Peck, Chas. E. & W. F.New York and Chicago.
Richardson, W. C.Cleveland.
Sullivan, D. & Co.Chicago.
Weeks, F. H.New York.

IRON ORE AND PIG IRON.

Bourne-Fuller Co.Cleveland.
Hanna, M. A. & Co.Cleveland.
Pickands, Mather & Co.Cleveland.

LATHE, FOR CUTTING PIPE THREADS.

Kent Machine WorksBrooklyn, N. Y.

LAUNCHES—STEAM, NAPHTHA, ELECTRIC.

Marine Construction & D. D. Co.
.....Mariner's Harbor, S. I., N. Y.
Truscott Boat Mfg. Co.St. Joseph, Mich.
Warrington Iron WorksChicago.
Willard, Chas. P.Chicago.

LIFE FLOATS.

Carley Life Float Co.New York.

LIFE PRESERVERS, LIFE BOATS, BUOYS.

Armstrong Cork Co.Pittsburg.
Drein, Thos. & SonWilmington, Del.
Kahnweiler's Sons, D.New York.
Lane & DeGrootLong Island City, N. Y.
Marine Construction & Dry Dock Co.
.....Mariner's Harbor, S. I., N. Y.

LIGHTS, SIDE AND SIGNAL.

Helvig, H. A. J.New York.
Russell & WatsonBuffalo.

LOGS.

Walker & Sons, ThomasBirmingham, Eng.
Nicholson Ship Log Co.Cleveland.
Also Ship Chandlers.

LUMBER.

Martin-Barriss Co.Cleveland.
Moran Bros. Co.Seattle, Wash.

MACHINISTS.

Chase Machine Co.Cleveland.
Macbeth Iron Co.Cleveland.
Union Machine & Boiler Co.Cleveland.
Ward Machine Co.Cleveland.

MACHINE TOOLS (WOOD WORKING).

Atlantic Works, Inc.Philadelphia.

MACHINERY, NEW AND SECOND HAND.

Bowler & Co. Geo. H.Cleveland.
Clyde Machine Works.Chicago.

MAN-HOLES, SWING DOORS, ETC.

"Long-Arm" System Co.Cleveland.

MARINE RAILWAYS, BUILDERS OF

Crandall & Son, H. I.East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W.New York.

MECHANICAL DRAFT FOR BOILERS.

American Ship Building Co.Cleveland.
Bloomsburg & Co., H.Baltimore, Md.
Buffalo Forge Co.Buffalo.
Detroit Ship Building Co.Detroit.
Sturtevant, B. F. Co.Boston.

METALLIC PACKING.

American Metallic Packing Co.Cleveland.
Hayden Mfg. Co., N. L.Columbus, O.
Katzstein, L. & Co.New York.
U. S. Metallic Packing Co.Philadelphia.

METAL POLISH.

Bertram's Oil Polish Co.Boston.

MOTORS, GENERATORS—ELECTRIC.

Buffalo Forge Co.Buffalo.
Electro-Dynamic Co.Philadelphia.
Elwell-Parker Electric Co.Cleveland.
General Electric Co.Schenectady, N. Y.
"Long Arm" System Co.Cleveland.
Seldler-Miner Electric Co.Detroit.
Sturtevant, B. F. Co.Boston.
United Marine Mfg. & Supply Co.New York.
Westinghouse Electric & Mfg. Co.Pittsburg, Pa.

NAUTICAL INSTRUMENTS.

Bliss, John & Co.New York.
Ritchie, E. S. & SonsBrookline, Mass.

NAVAL ARCHITECTS.

Gaskin, EdwardBuffalo.
Kidd, JosephDuluth, Minn.
Logan, RobertCleveland.
Mosher, Chas. D.New York.
Newman, R. L.New York.
Sadler, Perkins & Field.New York.
See, HoraceNew York.
Wood, W. J.Chicago.

OAKUM.

DeGrauw, Aymar & Co.New York.
Stratford Oakum Co.Jersey City, N. J.

OILS AND LUBRICANTS.

Dixon Crucible Co., JosephJersey City, N. J.
Standard Oil Co.Cleveland.

PACKING.

American Metallic Packing Co.Cleveland.
American Steam Packing Co.Boston.
Crane Co.Chicago.
Hayden Mfg. Co., N. L.Columbus, O.
Jenkins Bros.New York.
Katzstein, L. & Co.New York.
New York Belting & Packing Co.New York.
United States Metallic Packing Co.Philadelphia.

PAINTS.

Baker, Howard H. & Co.Buffalo.
Berry Bros., Ltd.Detroit.
Mohawk Paint & Chemical Co.New York.
New Jersey Zinc Co.New York.
Topky BrothersAshtabula, O.
Upson-Walton Co.Cleveland.

PATENT ATTORNEYS.

Thurston & BatesCleveland.

PATTERN SHOP MACHINERY.

Atlantic Works, Inc.Philadelphia.

PIPE—BRASS AND COPPER, IRON PIPE SIZE.

Waterbury Brass Co.New York.

PIPE, WROUGHT IRON.

Bourne-Fuller Co.Cleveland.
Crane Co.Chicago.
Macbeth Iron Co.Cleveland.

PLANING MILL MACHINERY.

Atlantic Works, Inc.Philadelphia.

PLATE BENDING AND PLANING MACHINES.

Wood & Co., R. D.Philadelphia.

PLUMBING, MARINE.

Mott, J. L., Iron WorksNew York.
Relly Repair & Supply Co., James.New York.
Sands, Alfred B. & SonNew York.

PNEUMATIC TOOLS.

Allen, John F.New York.
Chicago Pneumatic Tool Co.Chicago.
Railway Appliances Co.Chicago.

POLISH FOR METALS.

Bertram's Oil Polish Co.Boston.

POWER DOORS AND HATCHES.

"Long-Arm" System Co.Cleveland.

PRESSURE REGULATORS.

Kieley & MuellerNew York.
Ross Valve Co.Troy, N. Y.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

PROPELLER WHEELS.

American Ship Building Co.Cleveland
 Atlantic WorksEast Boston, Mass.
 Baltimore Ship Building & Dry Dock Co.Baltimore.
 Bath Iron Works, Ltd.Bath, Me.
 Cramp, Wm. & Sons.....Philadelphia.
 Detroit Ship Building Co.Detroit.
 Fore River Ship & Engine Co.Quincy, Mass.
 Great Lakes Engineering Works.....Detroit.
 Hyde Windlass Co.Bath, Me.
 Jenks Ship Building Co.Port Huron, Mich.
 Lockwood Mfg. Co.East Boston, Mass.
 Macbeth Iron Co.Cleveland.
 MacKinnon Mfg. Co.Bay City, Mich.
 Maryland Steel Co.Sparrow's Point, Md.
 Milwaukee Dry Dock Co.Milwaukee.
 Moran Bros. Co.Seattle, Wash.
 Neafie & Levy Ship & Engine Bldg. Co.Phila.
 Newport News Ship Bldg. Co.Newport News, Va.
 Nixon, LewisElizabeth, N. J.
 Phosphor Bronze Smelting Co., Ltd.Philadelphia.
 Pusey & Jones Co.Wilmington, Del.
 Risdon Iron WorksSan Francisco.
 Roelker, H. B.New York.
 Sheriffs Mfg. Co.Milwaukee.
 Superior Ship Building Co.Superior, Wis.
 Thropp & Sons Co., J. E.Trenton, N. J.
 Trigg, Wm. R. Co.Richmond, Va.
 Trout, H. G.Buffalo.

PROJECTORS, ELECTRIC.

Elwell-Parker Electric Co.Cleveland.
 General Electric Co.Schenectady, N. Y.
 Seldner-Miner Electric Co.Detroit.
 Westinghouse Electric & Mfg. Co.Pittsburg, Pa.

PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F. Mfg. Co.New York.
 Clyde Machine WorksChicago.
 Great Lakes Engineering Works.....Detroit.
 Kingsford Foundry & Machine Wks. Oswego, N. Y.
 Long Arm System Co.Cleveland.

PUNCHES, RIVETERS, SHEARS.

Chicago Pneumatic Tool Co.Chicago.

REFRIGERATING APPARATUS.

Roelker, H. B.New York.

REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes RegisterCleveland.
 Record of American & Foreign Shipping.....New York.

RELEASING HOOKS FOR DETACHING BOATS.

Standard Automatic Releasing Hook Co.New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.

Bourne-Fuller Co.Cleveland.

RANGES.

Russell & WatsonBuffalo.

RIVETS—BRASS AND COPPER.

Waterbury Brass Co.New York.

RUBBER INSULATED WIRES.

Roebbling's Sons, Jno. A.New York and Cleveland.

SAFETY VALVES.

American Steam Gauge Co.Boston.
 Ashton Valve Co.Boston.
 Hayden Mfg. Co., N. L.Columbus, O.
 Lunkenheimer Co.Cincinnati.

SAIL MAKERS.

Baker, Howard H. & Co.Buffalo.
 Upson-Walton Co.Cleveland.
 Wilson & SilsbyBoston.

SALVAGE COMPANIES.

See Wrecking Companies.

SCHOOLS—NAUTICAL, ENGINEERING.

Chicago Nautical SchoolChicago.

SEARCH LIGHTS.

Elwell-Parker Electric Co.Cleveland.
 General Electric Co.Schenectady, N. Y.
 Seldner-Miner Electric Co.Detroit.
 Westinghouse Electric & Mfg. Co.Pittsburg, Pa.

SHEARS.

See Punches, Rivets, and Shears.

SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co.Cleveland.

SHIP BUILDERS.

American Ship Building Co.Cleveland.
 Atlantic WorksEast Boston, Mass.
 Baltimore Ship Building & Dry Dock Co.Baltimore.
 Bath Iron Works, Ltd.Bath, Me.
 Buffalo Dry Dock Co.Buffalo.
 Columbia Iron WorksPort Huron.
 Cramp, Wm. & Sons.....Philadelphia.

Craig Ship Building Co.Toledo, O.
 Chicago Ship Building Co.Chicago.
 Detroit Ship Building Co.Detroit.
 Fore River Ship & Engine Co.Quincy, Mass.
 Great Lakes Engineering Works.....Detroit.
 Jenks Ship Building Co.Port Huron, Mich.
 Lockwood Mfg. Co.East Boston, Mass.
 Manitowoc Dry Dock Co.Manitowoc, Wis.
 Marine Construction & Dry Dock Co.
Mariner's Harbor, S. I., N. Y.
 Maryland Steel Co.Sparrow's Point, Md.
 Milwaukee Dry Dock Co.Milwaukee.
 Moran Bros. Co.Seattle, Wash.
 Neafie & Levy Ship & Engine Bldg. Co.Phila.
 Newport News Ship Bldg. Co.Newport News, Va.
 Nixon, LewisElizabeth, N. J.
 Pusey & Jones Co.Wilmington, Del.
 Risdon Iron WorksSan Francisco.
 Roach's Ship YardChester, Pa.
 Smith & Son, AbramAlgonac, Mich.
 Trigg, Wm. R. Co.Richmond, Va.
 Warrington Iron WorksChicago.
 Willard, Chas. P. & Co.Chicago.

SHIP CHANDLERS.

Baker, Howard H. & Co.Buffalo.
 Moran Bros. Co.Seattle, Wash.
 Reilly Repair & Supply Co., James.....New York.
 Upson-Walton Co.Cleveland.

SHIP LANTERNS AND LAMPS.

Helvig, H. A. J.New York.
 Page Bros. & Co.New York.
 Russell & Watson.....Buffalo.

SMOOTH-ON COMPOUND, FOR REPAIRS.

Smooth-On Mfg. Co.Jersey City, N. J.

SPARS—LARGE SIZES.

Moran Bros. Co.Seattle, Wash.

STAYBOLTS, IRON OR STEEL, HOLLOW, OR SOLID.

Falls Hollow Staybolt Co.Cuyahoga Falls, O.

STEAM VESSELS FOR SALE.

Elwell, Jas. W. & Co.New York.
 Holmes, Samuel.....New York.
 King, Rufus S.New York.
 McCarthy, T. R.Montreal, Can.
 Newman, R. L.New York.
 Weeks, F. H.New York.

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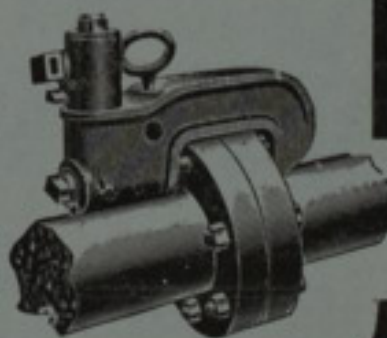
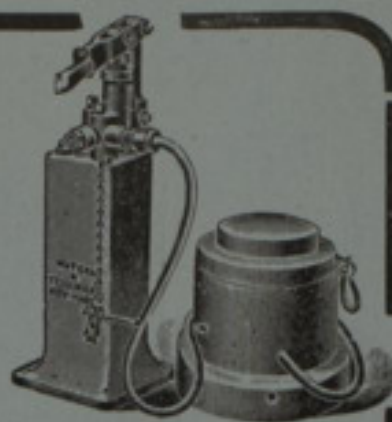
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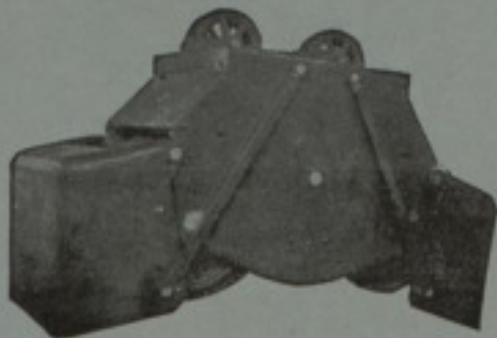
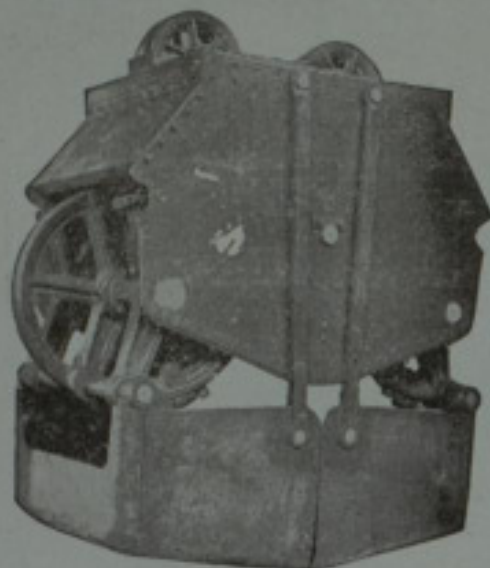
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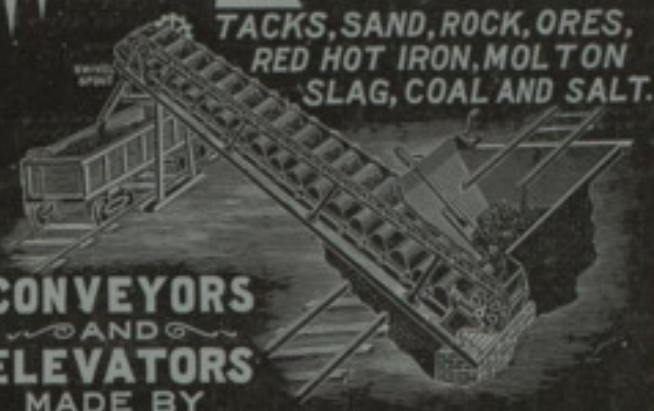


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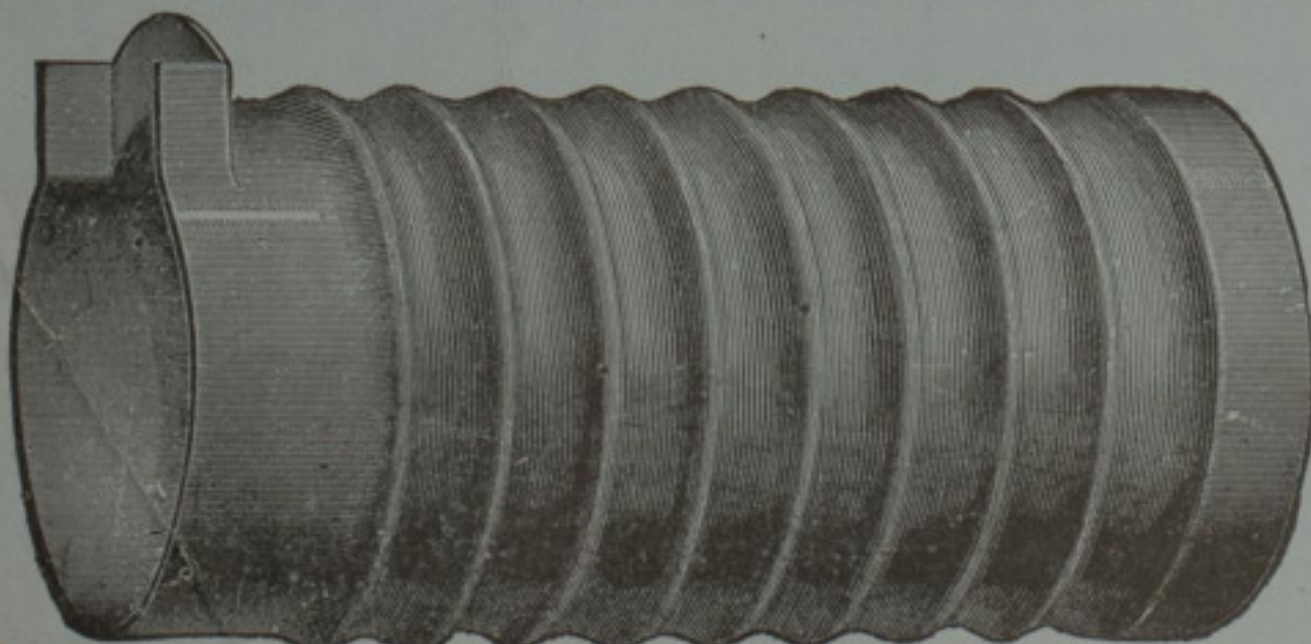
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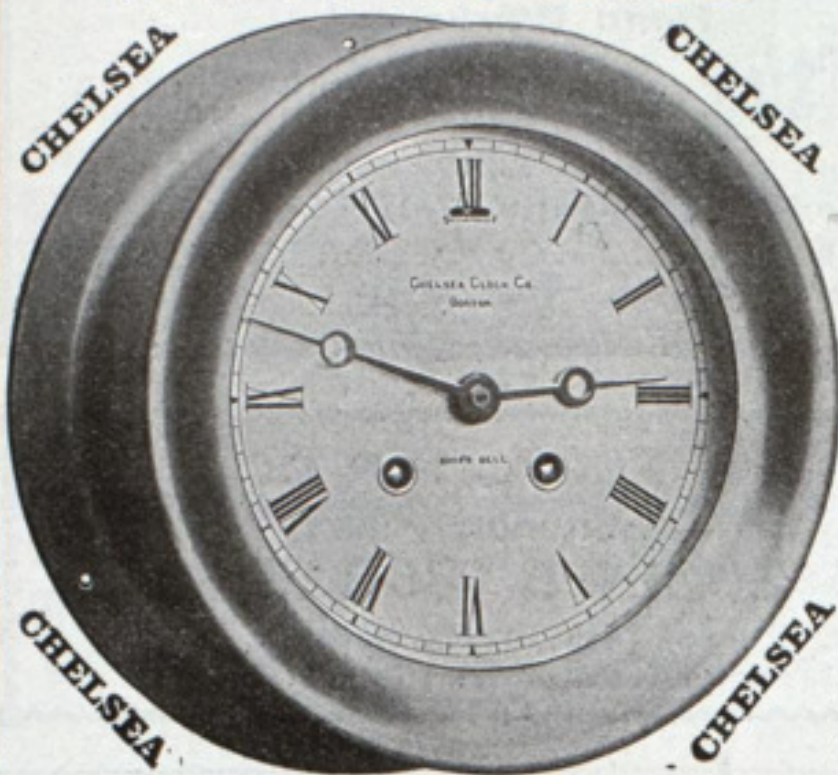
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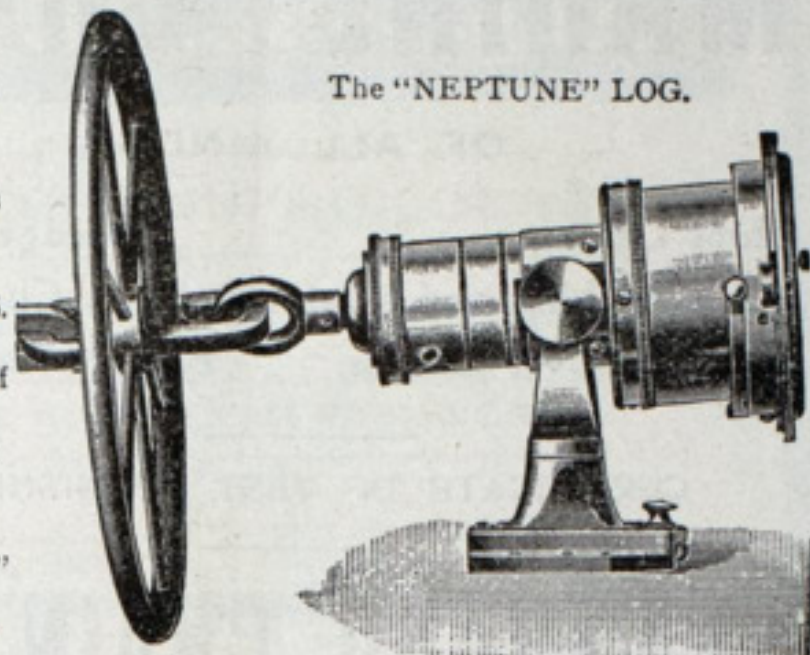
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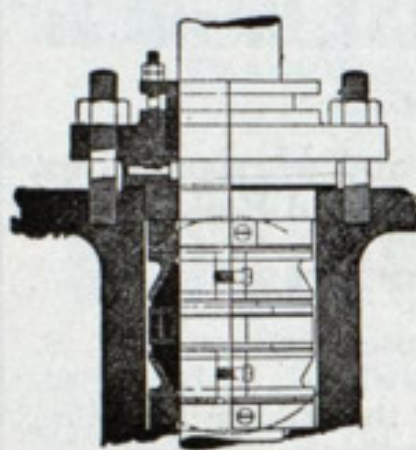
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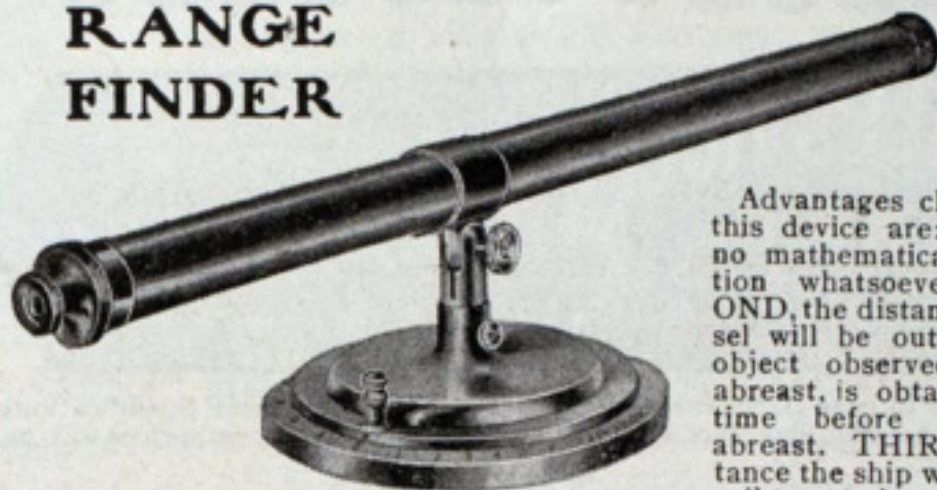
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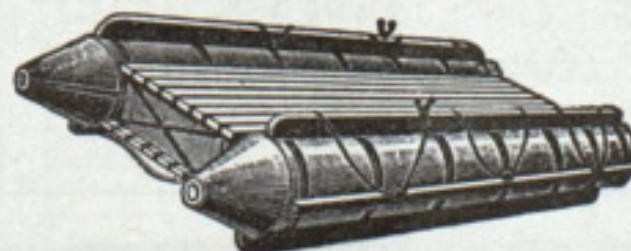


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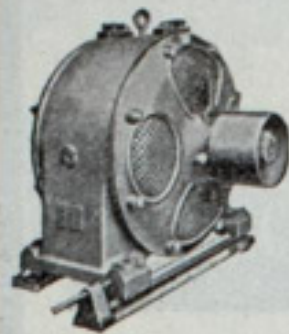
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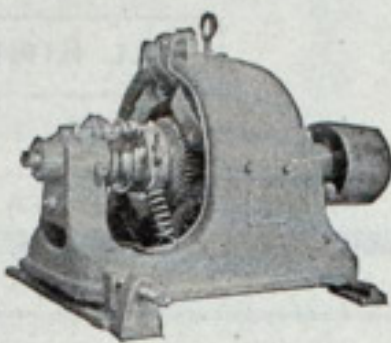


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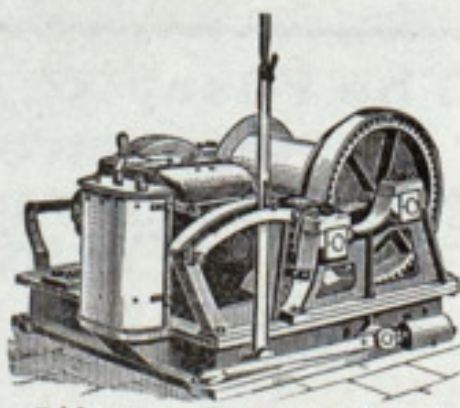
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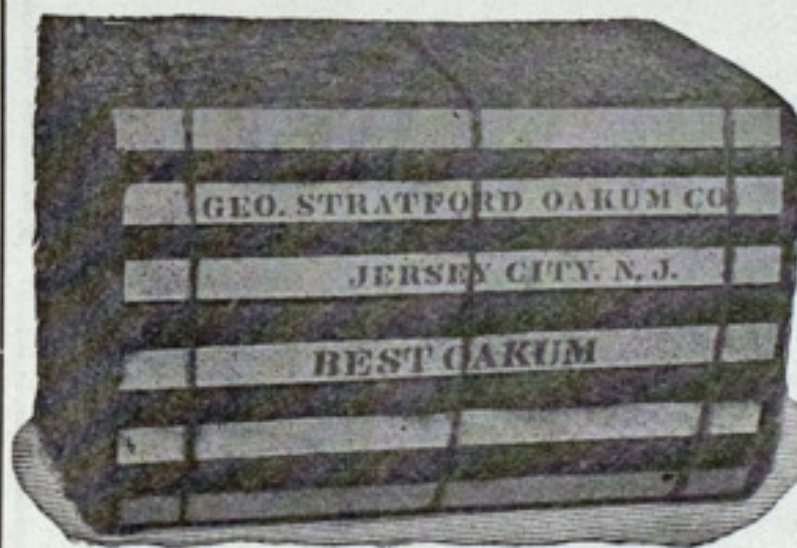
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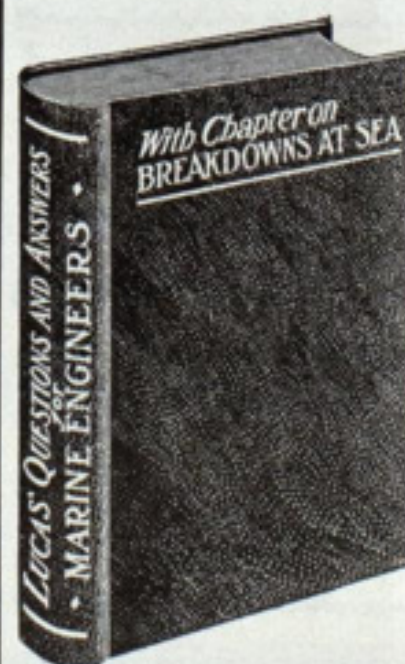
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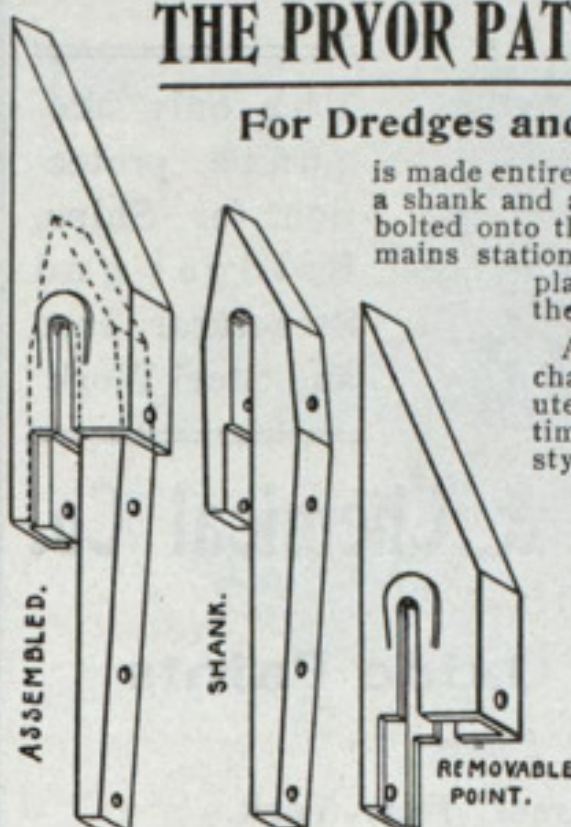
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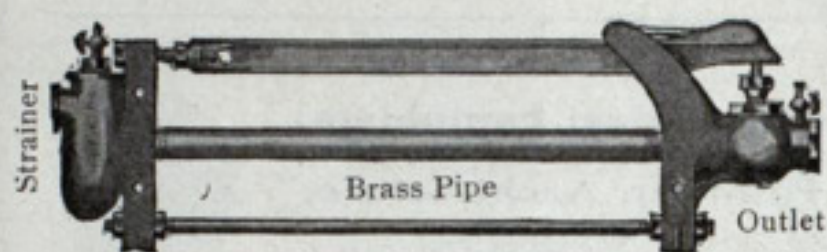
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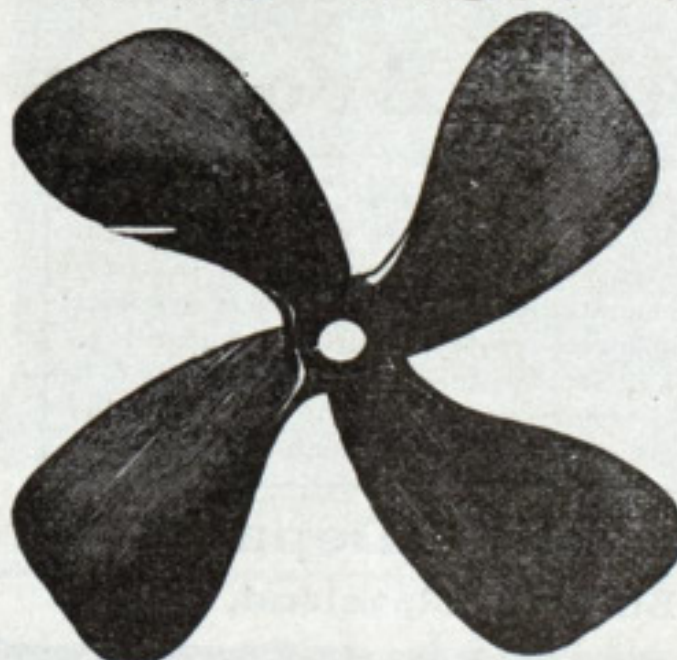
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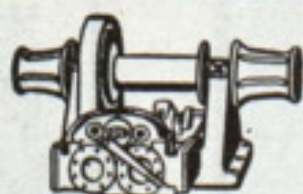
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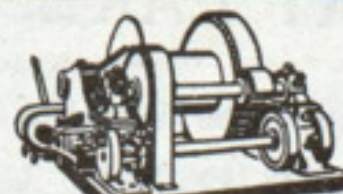
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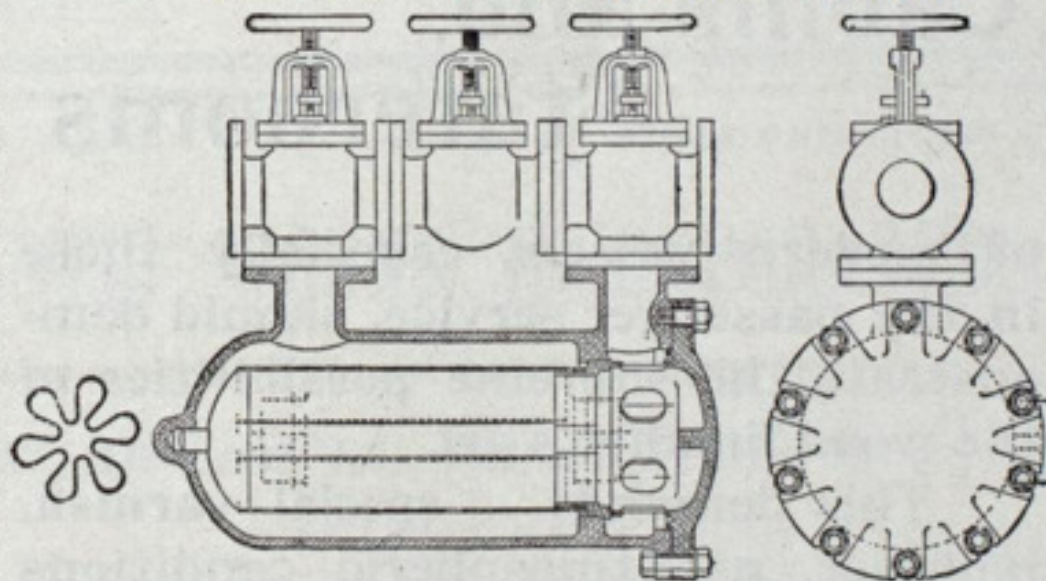
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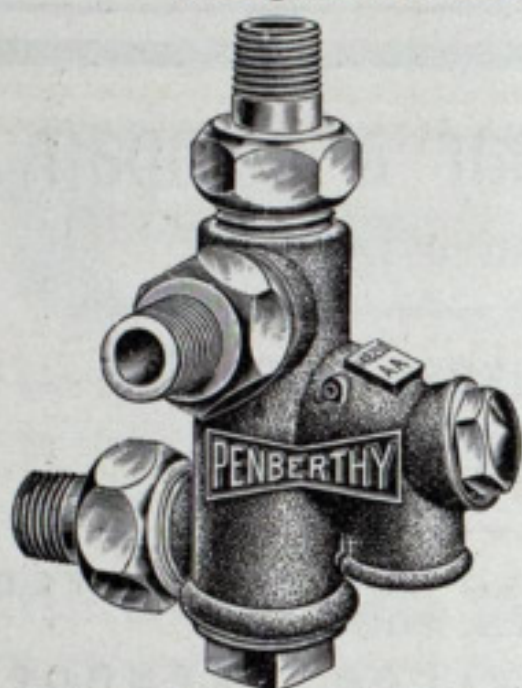
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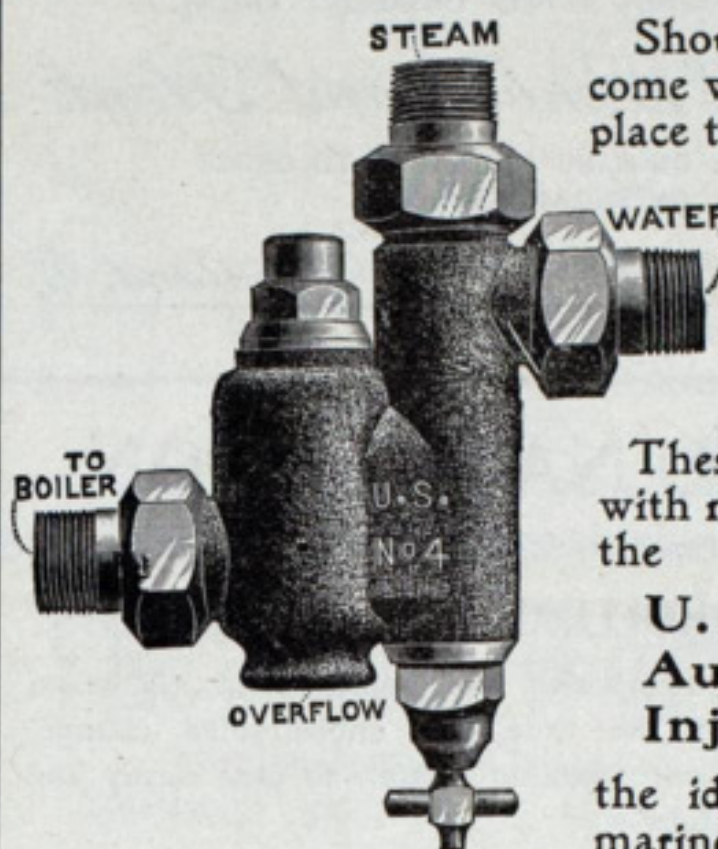
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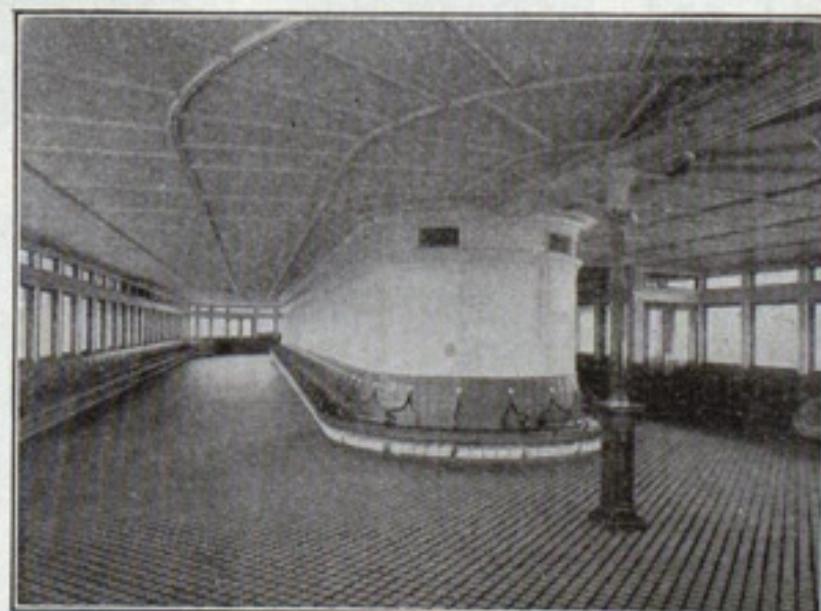
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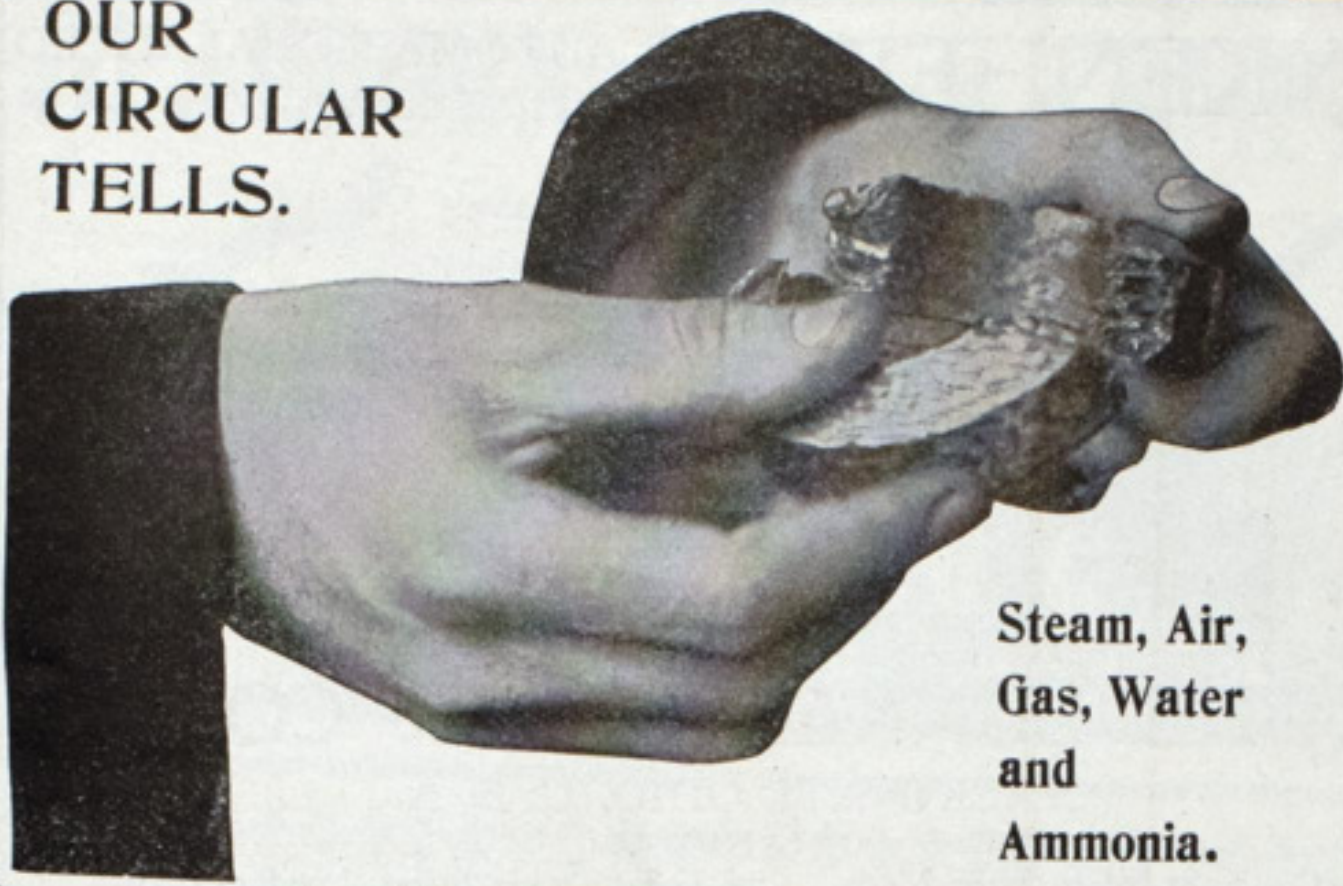
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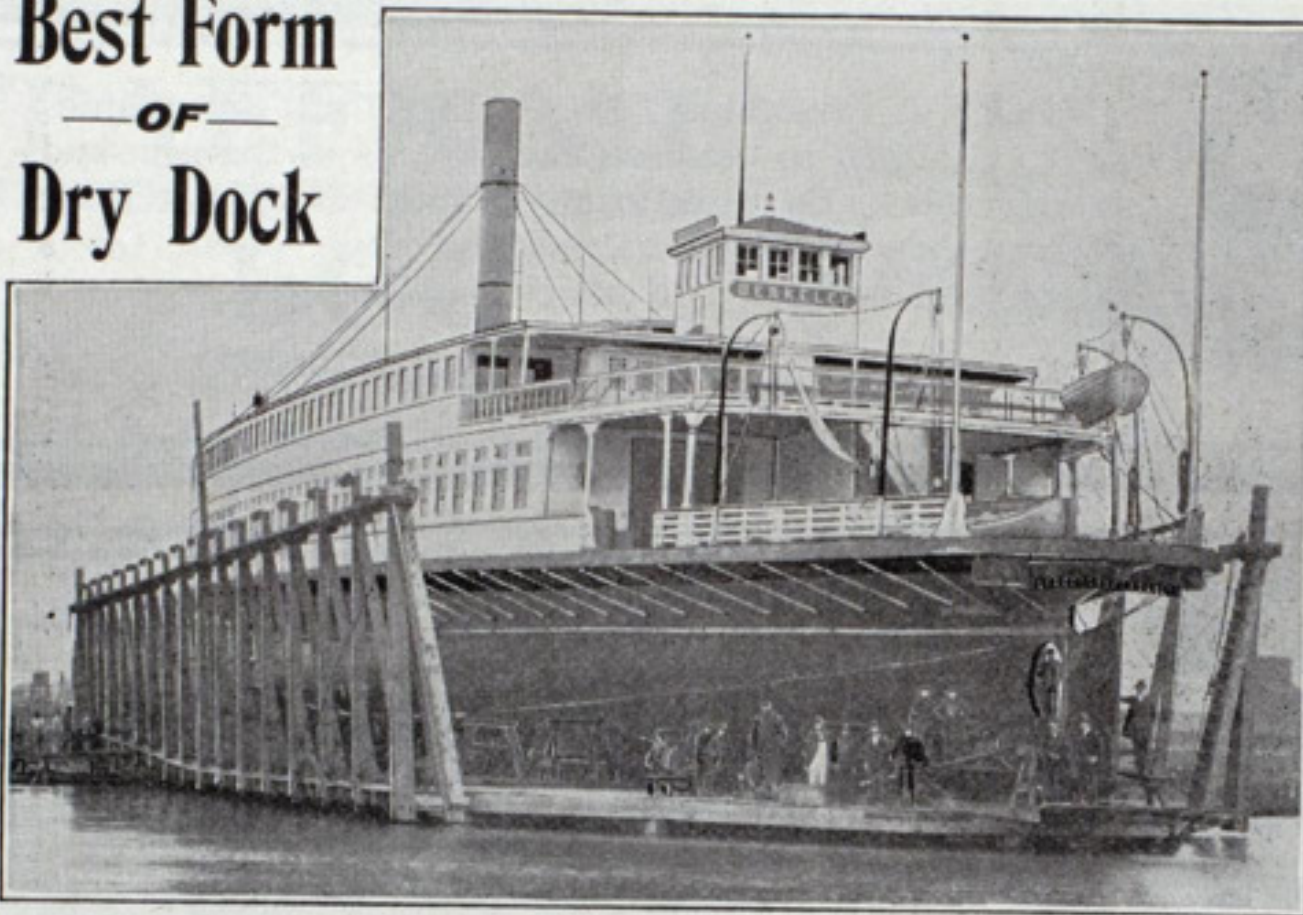
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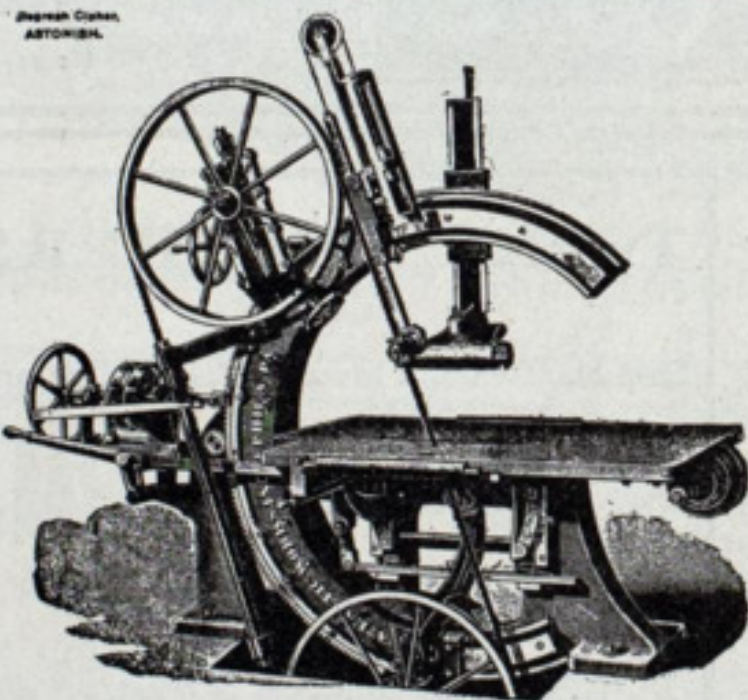
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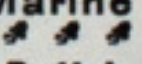
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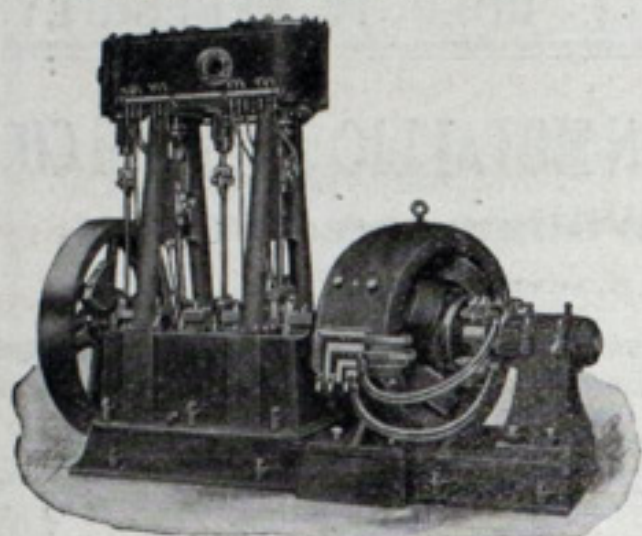
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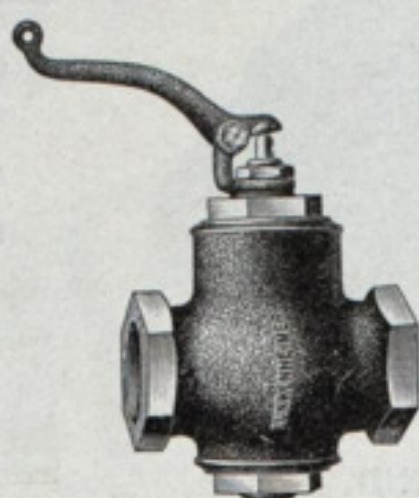
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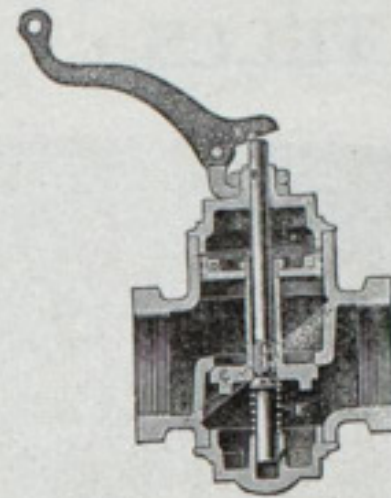
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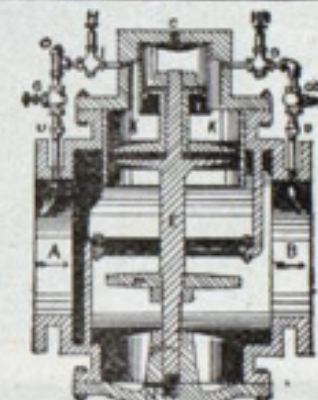
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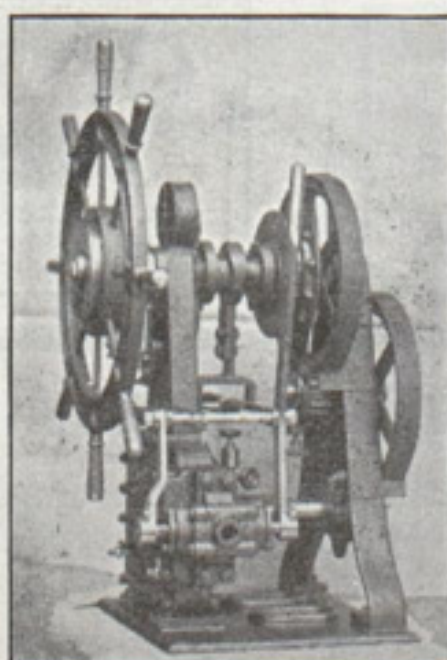
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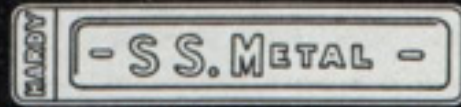
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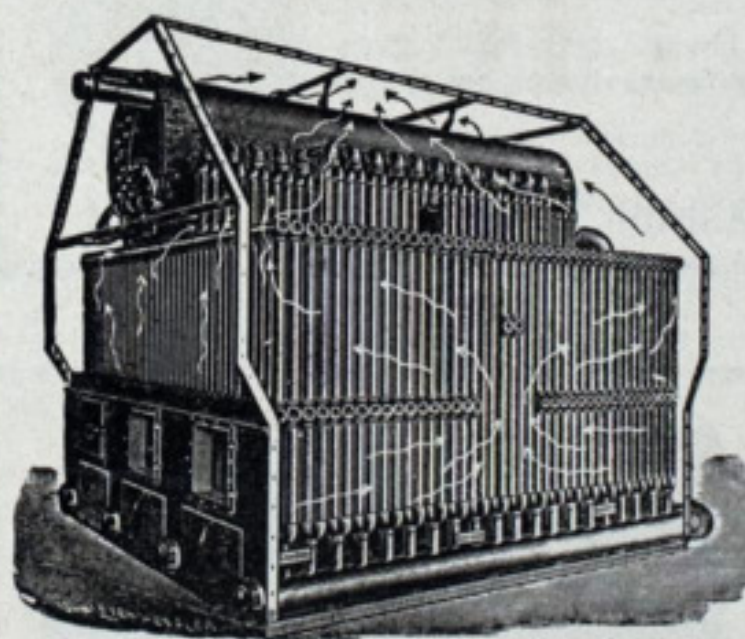
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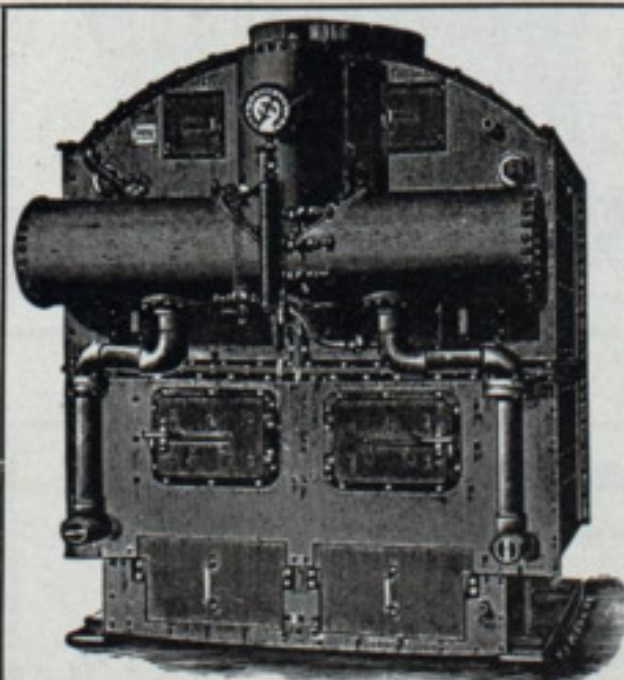
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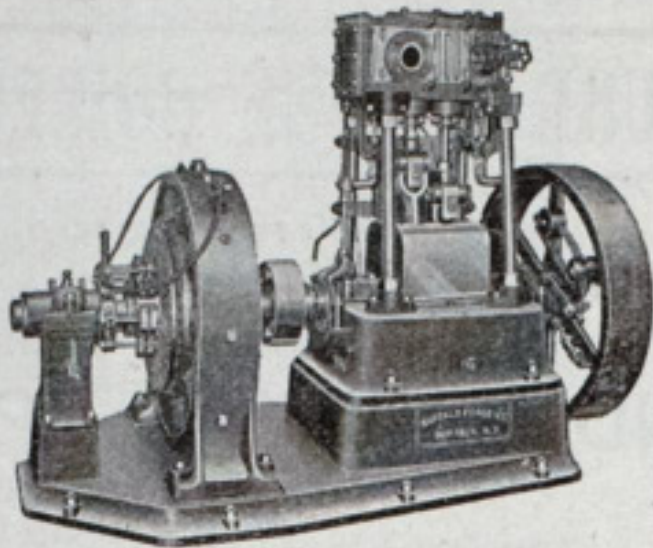
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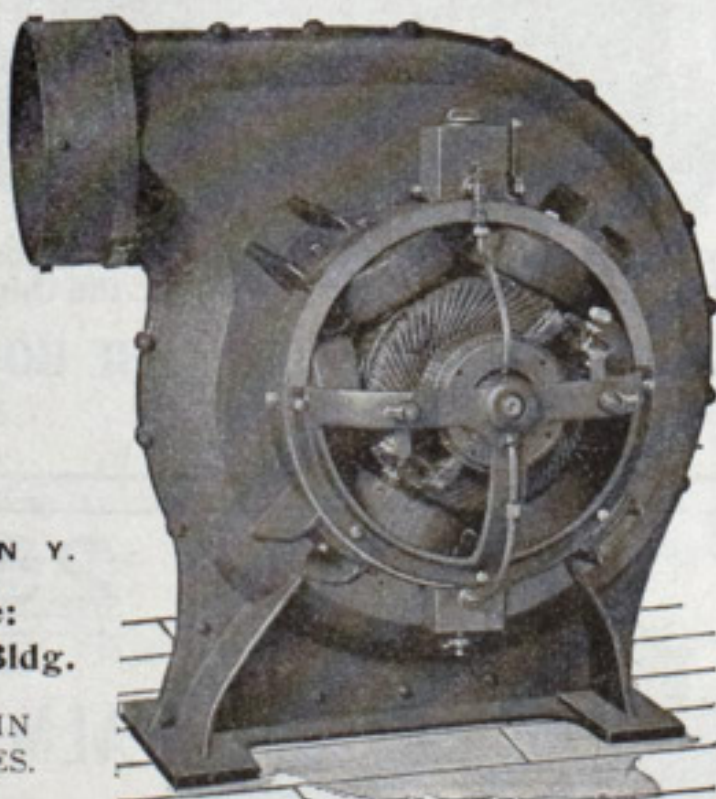
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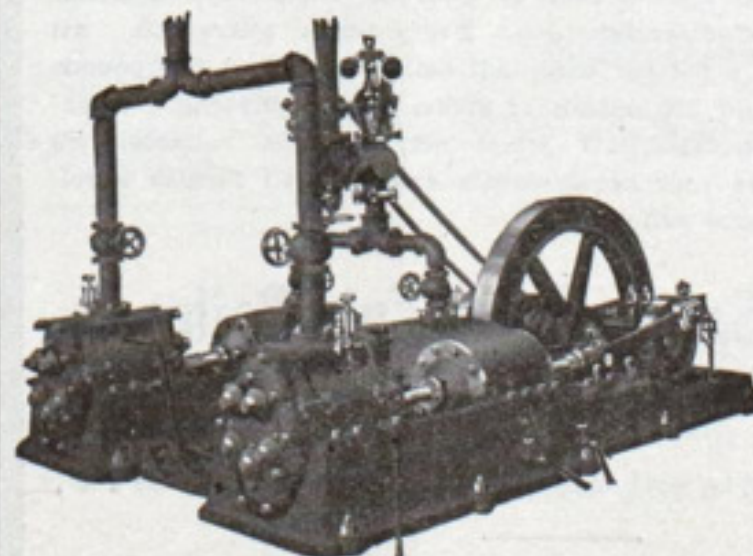
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